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The morphology of brooded larval shells in *Kellia suborbicularis* (Montagu, 1803) (Bivalvia: Galeommatoidea: Kelliidae)

Stefano Schiaparelli, Anabella Covazzi & Giancarlo Albertelli

KEY WORDS: Bivalvia, *Kellia suborbicularis*, brooding, larval morphology, Mediterranean..

ABSTRACT The larval morphology of the prodissoconch I of a Mediterranean specimen of *K. suborbicularis* (Montagu, 1803) is for the first time investigated with the scanning electron microscope, thanks to the finding of a brooding adult specimen. The size of the Mediterranean *K. suborbicularis* larvae is larger than that from the Atlantic, even if the "late brooding-" or "releasing-time" seems to be the same in the two regions (October). No other ecological or morphological differences were observed in the adult life. Only the study of more conspicuous material both from the Atlantic and the Mediterranean Sea will allow to interpret the observed discrepancy.

RIASSUNTO La morfologia larvale della prodissoconca I di un esemplare mediterraneo della specie *Kellia suborbicularis* (Montagu, 1803) viene illustrata per la prima volta con foto al microscopio a scansione grazie al ritrovamento di un esemplare adulto incubante. La taglia delle larve mediterraneee di *K. suborbicularis* è più grande di quella dell'Atlantico, anche se il tempo di rilascio delle stesse sembra essere lo stesso nelle due aree (Ottobre).
Non è stata notata alcuna differenza nell'ecologia o nella morfologia dell'adulto. Solo attraverso l'esame di più materiale proveniente dall'Atlantico e dal Mediterraneo si potrà eventualmente interpretare la differenza osservata.

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INTRODUCTION

Kellia suborbicularis (Montagu, 1803) is a small free-living bivalve which can be found in crevices or holes both on hard or soft substrata (Popham, 1940). It has two complete demibranchs on each side (Atkins, 1937), which are known to host, during breeding, myriad of larvae (Deroux, 1961). It is supposed to be a protogynous hermaphrodites by Oldfield (1961; 1964), but Ockelmann & Muus (1978) do not share this opinion.

In Galeommatoidea brooding behaviour is frequent (Ponder, 1998) and show a tendency towards lecithotrophy and ovoviparity (Chanley & Chanley, 1970).

Among the Mediterranean bivalves brooding behaviour is known for *Lasaea rubra* (Montagu, 1803), *Tellimya phascolionis* (Dautzenbergh & Fisher H., 1925), *Tellimya ferruginosa* (Montagu, 1808), *Mysella bidentata* (Montagu, 1803) and *Kellia suborbicularis* (Montagu, 1803) (Deroux, 1961).

This phenomenon is especially remarkable in *T. ferruginosa* and *K. suborbicularis*, due to the very great amount of retained larvae (Deroux, 1961); the last species embryos are then released as bivalved veliger (Oldfield, 1964) mainly in September-October (Lebour, 1938). Embryos of *K. suborbicularis* are known to be too small to be easily studied (Oldfield, 1964); in this work we document its "prodissoconch I", with the help of SEM photography.

MATERIALS AND METHODS

One specimen of *Kellia suborbicularis* (Montagu, 1803) brooding embryos was collected on October 1984 during the Bannock cruise in the Pontine Islands (South Tyrrhenian Sea), Station 49 (40°55.09' N, 13°00.36' E; 71 m depth).

Samples were collected by a Van Veen grab and sieved with a 2 mm mesh net. The bottom sediment was composed by gravelly sand with abundant shell debris.

Shelled embryos were dissected out from the gills; their prodissoconchs and the adult shell were polished with oxygen-peroxyde, dehydrated in alcohol then sputtered with gold for Philips E 515 SEM observations.

RESULTS

The larval shells extracted from the gill pouches are "*D*" shaped and measure about 103-104 µm in length and 66-69 µm in height. The hinge margin is straight and there are no signs of denticles. The sculpture is formed by a coarse texture of rounded depressions, more marked along the ventral margin (Figs. 1-4). Larval shells are only vaguely umbonate in respect of Lebour's (1938) specimens (Figs 7-9).

The shell of the brooding adult resulted partially damaged by the sampling activities. This lead on one hand to discover the brooded embryos, but, on the other hand, made the estimation of the approximate number of them impossible, due to the loss of an unknown number of larval shells. The hinge of the brooding adult is reported in Fig. 5 and 6.

DISCUSSION

Brooding behaviour is positively selected whenever it is necessary to concentrate the hatching event in space or time.

In Galeommatoidea the larval development could be direct or indirect (Ponder, 1998). All the species however, retain their larvae into the mantle cavity until at least the shelled prodissoconch stage, the larvae being released to develop further in the plankton (Ponder, 1998). For many species the peak of the release of larvae occurs during the summer months, but other species release larvae intermittently throughout the year (Booth, 1979). *K. suborbicularis* adults with developing eggs in the gills, are known to occur in the Plymouth area, in May, July and August, while shelled veliger larvae are
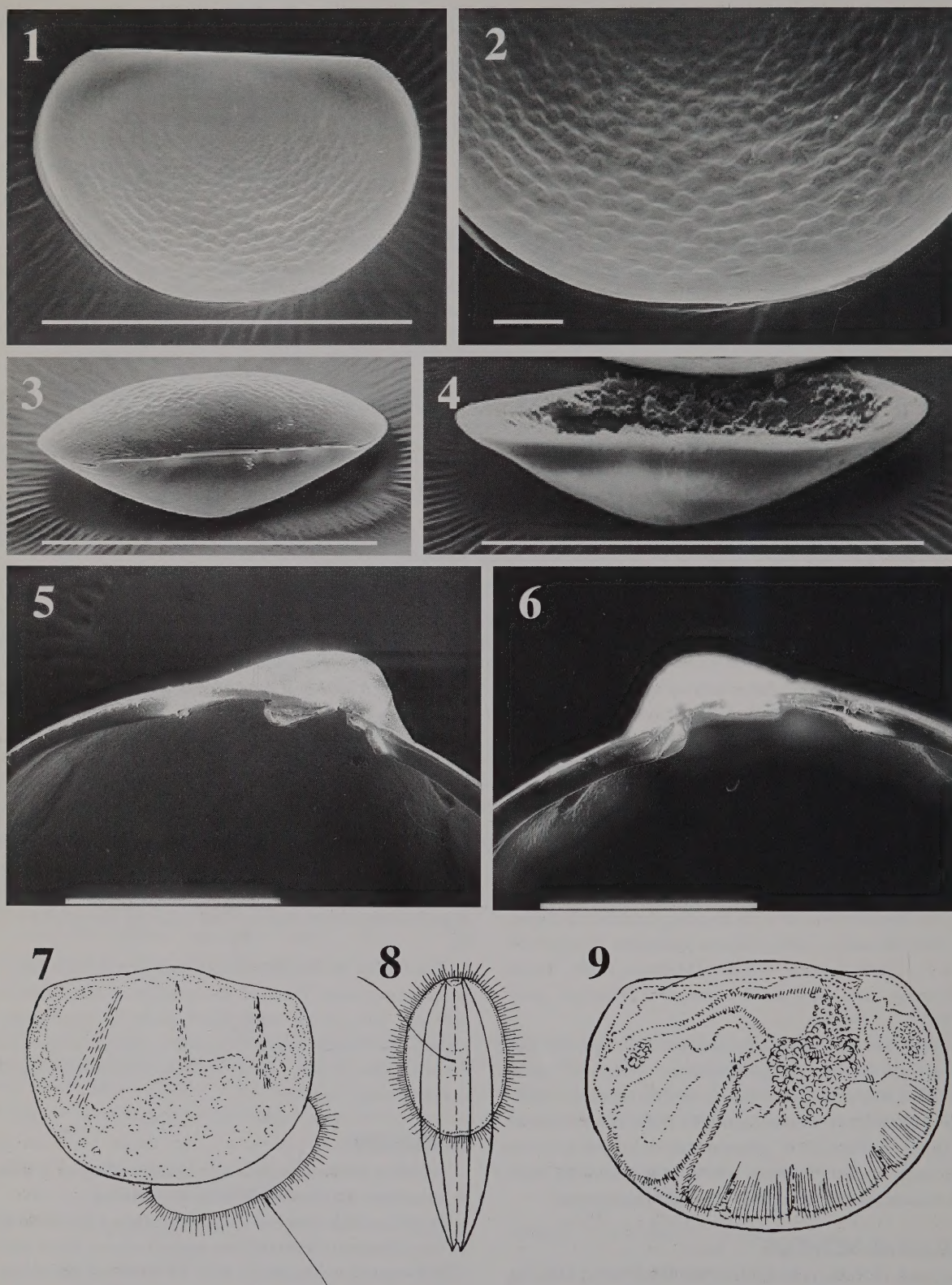
Fig. 1: K. *suborbicularis* "D" shaped brooded larvae. 1 – The entire larval shell (scale bar: 100 µm). 2 – Particular of the riddled surface near the ventral edge (scale bar: 10 µm). 3 – View of the larva from the dorsal margin, with the hinge in evidence (scale bar: 100 µm). 4 – Same view of a single valve (scale bar: 100 µm). 5 – View of the hinge of the left valve of the brooding specimen (scale bar: 1 mm). 6 – View of the right valve hinge (same scale). 7 – Lebour's (1938) original figure of a newly extruded larva (September; 64 µm in length) . 8 – The same, ventral view. 9 – Lebour's (1938) original figure of a veliger one day after extrusion (October; 80 µm in length).

Genus or species	Author	Dimensions at hatching (prodissoconch I)	Larvae released as:	Reference
Family: GALEOMMATIDAE				
Galeomma turtoni	Turton, 1825	70 µm (trochophores ?)	Early shell-less larvae	LEBOUR, 1938
Family: KELLIIDAE				
		64-80 µm (length)	Shelled Veliger larva at hatching	LEBOUR, 1938 (Plymouth)
Kellia suborbicularis	(Montagu, 1808)	110 µm (length)	After 14 days	
		160 µm (length)	After 3 weeks	
		300-370 µm (length)	Veliger ready to metamorphose	
Kellia suborbicularis	(Montagu, 1808)	103-104 µm (length) 66-69 µm (height)	Still brooded larvae	**Present study** (Mediterranean)
Family: LASAEIDAE				
Lasaea rubra	(Montagu, 1803)	600 µm	Adult miniature	LEBOUR, 1938
Family: MONTACUTIDAE				
Tellimya ferruginosa	(Montagu, 1808)	140 µm (length)	Veliger larva	LEBOUR, 1938
		150 µm (length)	Late Veliger larva	LEBOUR, 1938
Mysella bidentata	Montagu, 1808	127-148 µm (length) 93-115 (heigth)		OCKELMAN & MUUS, 1978
Tellimya phascolionis	(Dautzenberg & H. Fisher, 1925)	———	Adult miniature	OLDFIELD, 1961
Epilepton clarckiae	(W. Clarck, 1852)	———	Adult miniature	PEELSENER, 1925

Tab. 1. Main dimensional values of some *Galeommatoidea prodissoconchs.*

emitted from September to October (LEBOUR, 1938). Since the larvae of this species can be found in the plancton in any month of the year, but especially in summer and early autumn, the breeding season appears to be spring-summer and early autumn, with occasional larvae in the winter (LEBOUR, 1938). LEBOUR (1938) reports lengths of 64-80 µm for *K. suborbicularis* released shelled larvae, according on the month at which they were released (September and October respectively) (Tab. 1).

The *K. suborbicularis* brooded larvae from Bannock expedition had complete larval shells, and thus were probably near to be released in the plancton. Their size however, 103-104 µm in length and 66-69 µm in height, results to be larger than that reported in the Atlantic for yet released larvae and more similar to the one of larvae which spent about two weeks in the plancton (Tab. 1).

Lecitotrophy has to be excluded, among Mediterranean populations of *K. suborbicularis*, since their larval size being smaller than 230-500 µm (typical of prodissoconchs I without planctonic phase; JABLONSKI & LUTZ, 1980) undoubtedly ascribe these brooded larvae to planktotrophic or lecithotrophic veligers.

Moreover, lecitotrophy occurs in Galeommatoidea only when a specialised commensal adult ecology is employed. Among Mediterranean Galeommatoidea in fact, this behaviour is known only for *Tellimya*, *Mysella*, *Epilepton* and *Hemilepton* (review in BOSS, 1965), but not for *Kellia*.

No data concerning latitudinal shifts in the larval strategies are available for these small bivalves and, in the absence of more nume-

rous living-collected specimens to study, the interpretation of the different sizes between Mediterranean and Atlantic *K. Suborbicularis* larval shells remains open.

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Abnormality of Shell-Plates in *Chiton cumingsii* Frembly, 1827 (Mollusca: Polyplacophora: Chitonidae)

Enrico Schwabe

KEY WORDS: Polyplacophora, Chitonidae, *Chiton cumingsii*, abnormality

ABSTRACT Shell abnormatity is illustrated and described for the first time for *Chiton cumingsii* Frembly, 1827. One hypomerism specimen with 7 valves is reported. The other specimen shows an interesting defect, the head valve is injured in the anterior part and has developed a new insertion plate under the already existing one.

RIASSUNTO Per la prima volta sono descritte ed illustrate anormalità della conchiglia in *Chiton cumingsii* Frembly, 1827. Viene riportato un'individuo con 7 valve. Un altro individuo mostra la seguente anomalia: la placca di testa è danneggiata nella parte anteriore ed ha sviluppato una nuova placca sotto quella esistente. I risultati vengono discussi alla luce di altre segnalazioni bibliografiche.

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INTRODUCTION

Shell abnormality in chitons is a well known phenomenon, reported by several authors for different species. Within the teratology of the Polyplacophora we differentiate four cases of abnormality (TAKI, 1932; DELL'ANGELO & TURSI, 1990):

hypomerism – less than the regular eight plates

hypermerism – more than the regular eight plates (so far only 9-valved specimen are known)

coalescens – the coalescence (connection) of a plate with the adjacent plate (in most cases with the reduction, or partly reduction of the plate)

splitting – the division of a plate in different parts (in most cases at least one of the parts build a coalescence)

DELL'ANGELO & TURSI (1990) presented a complete list of previously reported abnormal species. According to this work no record of abnormality has ever been mentioned from *Chiton cumingsii* Frembly, 1827, although this is a common species.

MATERIAL

The material investigated belongs to the molluscan collection of the Zoological State collection Munich (ZSM) and are registered under the numbers „20000381“ and „20000600“. Both specimens are dry preserved and lack their soft parts.

A regular grown specimen of *Chiton cumingsii*, which was used for comparision with the 7-valved specimen (ZSM 20000381), is registered under the ZSM number „20000466“. It was collected in 1919 in Valparaiso, Chile and is also dry preserved, without soft parts.

DESCRIPTION

Chiton cumingsii Frembly, 1827
Fig. 1

One specimen belonging to the Zoological State collection Munich (ZSM 20000381) was collected in Chile and is part of the Flossmann collection, which became property of the ZSM in 1915.

It measures 41 x 24.5 mm, is flat and dry preserved with the soft part lacking. It is a hypomerism specimen in which the 7 plates are of regular form and size. Comparision with a regular grown specimen (ZSM 20000466) of the same size shows, that in the 7-valved specimen nearly all plates are somewhat larger than in the 8-valved one. (see Table 1)

Chiton cumingsii Frembly, 1827
Fig. 2 (A-C)

This specimen (ZSM 20000600) shows an abnormality which better should be interpreted as defect, because none of the terms used in teratology characterises the features investigated in this specimen.

The animal belongs to the Dr. W. Blume collection (Nr. 6546) and is labeled as „*Chiton (Chiton* Sect. *Radsia) cumingi* Fremb“.

The locality mentioned on the original label („Ind. occ.“) surely based on the handwritten „West Indien“ on the articulamentum of the tail valve. Both interpretations are wrong, as the species never was found in the Caribbean Sea. It lives along the western coast of South America from Peru southwards to Chile.

The specimen (the head valve has been removed) measures 38.8 x 26.3 mm, is flat preserved and lacks the soft part.

The tegmentum on the head valve is defect by having a superficial incision (see Figs. 2B-C). The inner shell layer (articulamentum) is visible in form of insertion plate (8 slits). The interior surface appear normal except for the valve-defect which is showing through. The articulamentum of head valve shows 15 distinct slits.

DISCUSSION

TUCKER and GIESE (1959) have shown that few species belon-

ging to the class Polyplacophora are able to repair their valves when they are defect. The process is rather complex and differs in the degree of perfection from species to species. The time needed for the repair seems to depend on the weight of the injured valve and also on the form of violation.

DELL'ANGELO and PALAZZI (1983) have described an abnormal duplication of tegmentum and articulamentum (insertion teeth) in *Callochiton septemvalvis* (Montagu, 1803) [as *Callochiton achatinus* (Brown, 1823)], which seems to be the same case as in the herein described second specimen of *Chiton cumingsii* Frembly, 1827 (ZSM 20000600) (Fig. 2). The valve-defect possibly was caused by an injured girdle in the juvenil specimen. Since the soft parts of the head are situated directly under the valve, the repair of this part might be of great value. The specimen, however, only produced a thin nacreous layer of articulamentum which covers the defect internally, but it was not able to repair the valve completely.

A similar defect was observed in the tail valve of a specimen of *Ischnochiton tridentatus* Pilsbry, 1893, also present in the ZSM (19990473).

The form of abnormality described above seems rather rare, as only four species are reported so far – *Callochiton septemvalvis* (see DELL'ANGELO and PALAZZI, 1983; BASCHIERI, DELL'ANGELO & PALAZZI, 1992 [*Callochiton septemvalvis euplaeae*]), *Chiton (Rhyssoplax) etruscus* (see DELL'ANGELO & FORLI, 1995), *Ischnochiton tridentatus* and *Chiton cumingsii* (this report).

Number	7-valved		8-valved	
	41 x 24.5		40.5 x 23.7	
	l	w	l	w
I	7.8	16.7	6.8	14.2
II	7.1	19.1	5.2	16
III	3.3	21.4	4.1	17.2
IV	5.2	20.1	3.8	17.8
V	5.5	20.8	4.7	17.7
VI	4.6	19.2	4.5	17.7
VII	-	-	3.9	17
VIII	8.6	16.5	7.3	15.2

Table 1. *Chiton cumingsii* Frembly, 1827, valve dimensions, l – length, w - width (all measurements are in mm)

Figs 1 *Chiton cumingsii* Frembly, 1827 (ZSM 20000381), dorsal view (scale bar 2 cm)

Figs. 2 *Chiton cumingsii* Frembly, 1827 (ZSM 20000600); A. dorsal view (scale bar 2 cm); B. close up of the head valve, showing the defect in dorsal view (scale bar 1cm); C. detail of the defect, showing the insertion plate, frontal view (scale bar 0.5 cm)

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The presence of *Chauvetia turritellata* (Deshayes, 1835) in Izmir Bay (Aegean Sea)

Bilal Öztürk, Cem Çevik

KEY WORDS: Muricidae, *Chauvetia*, Aegean Sea, Turkey

SUMMARY A single alive specimen of *Chauvetia turritellata* was collected during benthic researches carried out in Izmir Bay between 1996-1998. This is the first record of the species for the Aegean coast of Turkey. Some information and a photograph of the species are also given in the present study.

RIASSUNTO Un esemplare vivente di *Chauvetia turritellata* è stato raccolto durante ricerche bentoniche effettuate nella baia di Izmir negli anni 1966-1998. Questo è il primo ritrovamento della specie per le coste egee della Turchia. Alcune informazioni ed una fotografia della specie sono date con la presente nota.

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INTRODUCTION

The genus *Chauvetia* was poorly known until recently, which is represented by 15 species (SABELLI *et al*, 1990:37, 194) in the Mediterranean Sea. Some studies on this genus exists, such as TIBERI (1868) and NORDSIECK (1976), however, taxonomical confusions are still encountered due to colour variations peculiar to some species. SABELLI *et al.* (1992:398) stated that detailed examinations on the genus *Chauvetia* are required. In this context, the study carried out by MICALI (1999) can be considered as an appropriate response to SABELLI's statement, which includes taxonomic characteristics and distributions of *Chauvetia* species encountered along the coasts of northeastern Atlantic Ocean.

MATERIAL AND METHODS

The single alive specimen of *Chauvetia turritellata* was collected during studies carried out in Izmir Bay on board the R/V "K.Piri Reis" between 1996-1998 (Fig.1). The samplings were performed at 30 stations using grab, beam-trawl and trawl at depths ranging 10 to 77 m.

RESULTS

Classis: Gastropoda
Superordo: Caenogastropoda
Ordo: Neogastropoda
Familia: Muricidae
Genus: *Chauvetia*
Chauvetia turritellata (Deshayes, 1835)

Material examined: Izmir Bay (Aegean Sea), one specimen, 08.11.1997, sandy-muddy habitat, depth 20 m, grab (Fig.2).

Diagnosis: DESHAYES (1835: 205-206, fig.27 in CLEMAM), MICALI (1999: 61-62, fig.15-18, 24-26).

DISCUSSION

C. turritellata was first described as *Fusus turritellatus* by DESHAYES (1835: plate XIV, figs.28,29,30 according to the CLEMAM database).

The species is distributed along the coasts of eastern Atlantic Ocean and the Mediterranean (MICALI, 1999). According to the same author, it was previously reported from Antalya and Kash both on the Turkish southern coast. This is the first record of the species for the Aegean coast of Turkey. The specimens of *C. turritellata* recorded by NORDSIECK (1976) from Paros Island (Aegean Sea) were actually based on a misidentification. Moreover, the species described as *Chauvetia vulpecula* (Monterosato, 1872) and *Chauvetia vulpecula attenuata* Nordsieck, 1976 in NORDSIECK's study are stated by MICALI (1999) to be *C. turritellata*.

The author also pointed out that colour variations are observed in *C. turritellata*, which is generally confused with *Chauvetia mamillata* (Risso, 1826), *Chauvetia recondita* (Brugnone, 1873) and *Chauvetia brunnea* (Donovan, 1804). For this reason, *Chauvetia brunnea* which was recorded by Koutsoubas *et al.* (1997) from Greek side of Aegean Sea is highly probable *C. turritellata*.

Because the distribution of *C. brunnea* is in western basin of Mediterranean Sea, and it is considered that species' eastern border is southern coast of Sicily Island. Furthermore, Micali (1999) stated that *Chauvetia affinis* (Monterosato, 1889) which was described by Sabelli *et al.* (1990:37, 193) as a different species and reported by Koutsoubas *et al.* (1997) from Greek coasts of Aegean Sea is colour variety of *C. turritellata*. Consequently, only two species, *C. turritellata* and *Chauvetia candidissima* (Philippi, 1836) of the genus *Chauvetia* are known recently from Aegean Sea.

ACKNOWLEDGEMENTS

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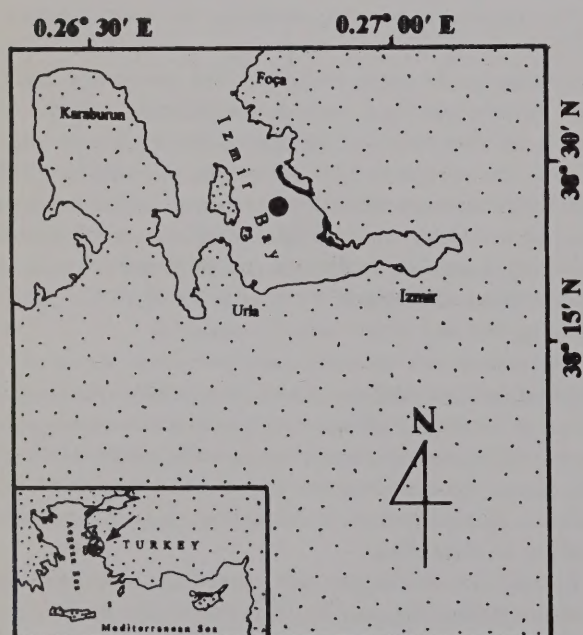
Figure 1. The view of the study area and the locality where the specimen encountered.
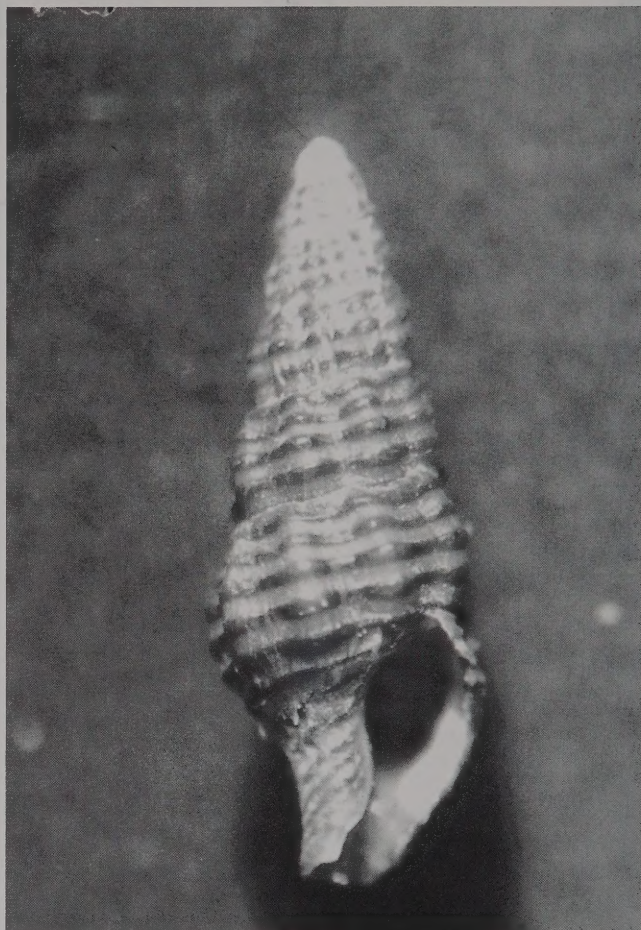
Figure 2. *Chauvetia turritellata* (Deshayes, 1835), Height = 5.4 mm.

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The species usually reported in the subgenus *Brochina* (*Caecum*,Caecidae, Caenogastropoda) from Brazil and some relevant type specimens from western Atlantic

Ricardo Silva Absalão & Renata dos Santos Gomes

KEY WORDS: Caecidae, *Caecum*, *Brochina*, taxonomy, primary types, Brazil, western Atlantic.

ABSTRACT Conchological analysis revealed the existence of eight species belonging to the genus *Caecum*, subgenus *Brochina* in Brazilian waters: *Caecum antillarum* Carpenter, 1858, *C. someri* de Folin, 1867, *C. achironum* de Folin, 1867, *C. circumvolutum* de Folin, 1867, *C. multicostatum* de Folin, 1867, *C. strigosum* de Folin, 1867, *C. marmoratum* de Folin, 1870 and *C. lineicinctum* de Folin,1879. The record of the latter is the first from Brazil. The eight species are discussed, established synonymies reported, and some new synonymies proposed. Scanning electron microscope illustrations are provided of the following type-specimens: the holotypes of *C. venosum* de Folin, 1867, *C. lineicinctum* de Folin, 1879, and *C. butoti* De Jong & Coomans, 1988; paratypes of *C. antillarum* Carpenter, 1858 and *C. johnsoni* Winkley, 1908; syntypes of *C. heladum* Olsson & Harbison, 1954; and lectotypes (herein designated) of *C. achironum* de Folin, 1867, *C. multicostatum* de Folin, 1867, *C. someri* de Folin, 1867, *C. strigosum* de Folin, 1867, *C. subvolutum* de Folin, 1867, *C. striatum* de Folin, 1868, *C. carmenensis* de Folin, 1870, *C. marmoratum* de Folin, 1870, *C. veracruzanum* de Folin, 1870, *C. vestitum* de Folin, 1870, *C. limpidum* de Folin, 1874 and *C. subornatum* de Folin, 1874.

RIASSUNTO L'analisi conchigliare ha rivelato l'esistenza, nelle acque del Brasile, di otto specie appartenenti al Genere *Caecum*, Sottogenere *Brochina*: *Caecum antillarum* Carpenter, 1858; *C. someri* de Folin, 1867, *C. achironum* de Folin, 1867, *C. circumvolutum* de Folin, 1867, *C. multicostatum* de Folin, 1867, *C. strigosum* de Folin, 1867; *C. marmoratum* de Folin, 1870; e *C. lineicinctum* Folin,1879. Il ritrovamento di quest'ultimo è il primo per il Brasile. Queste otto specie vengono discusse, sono fornite alcune sinonimie e ne sono proposte altre nuove. Sono inoltre fornite fotografie al Microscopio Elettronico a Scansione (MES) dei seguenti esemplari-tipo: gli olotipi rispettivamente di *C. venosum* Folin, 1867, *C. lineicinctum* Folin, 1879, e *C. butoti* De Jong & Coomans, 1988; paratipi di *C. antillarum* Carpenter, 1858 e *C. johnsoni* Winkley, 1908; sintipi di *C. heladum* Olsson & Harbison, 1954; e lectotipi (qui designati) di *C. achironum* de Folin, 1867, *C. multicostatum* de Folin, 1867, *C. someri* de Folin, 1867, *C. strigosum* de Folin, 1867, *C. subvolutum* de Folin, 1867, *C. striatum* de Folin, 1868; *C. carmenensis* de Folin, 1870, *C. marmoratum* de Folin, 1870, *C. veracruzanum* de Folin, 1870, *C. vestitum* de Folin, 1870, *C. limpidum* de Folin, 1874 e *C. subornatum* de Folin, 1874.

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INTRODUCTION

The family Caecidae Gray, 1850 has a controversial phylogenetic history, having been previously allocated to the Scaphopoda, the Pteropoda, and even the Cephalopoda (MOORE, 1962). These various allocations were made because of the cylindrical shell and the successive discarding of the old end of the shell during the development of the animal. This distinct manner of shell growth also causes problems in defining the boundaries between supraspecific taxa within the family.

According to CARPENTER (1858), the genus *Brochina* Gray, 1857 could be distinguished from *Caecum* Fleming, 1817 by the convex operculum, but he expressed his concern about the status of the taxon at the generic level because of the differing degree of convexity in different individuals. This character was also used by BARTSCH (1920) in his key to the genera of the family. De Folin (1867) considered *Brochina* as a valid genus, and described *Brochina achirona* and *Brochina someri*.

DALL (1892) did not consider the genus *Brochina* as a member of the family Caecidae, including only members of *Meioceras* Carpenter, 1858 and *Caecum* Fleming, 1817 among the Recent species. KEELER (1981), MELLO & MAESTRATI (1986), and RIOS (1994) all considered *Brochina* as a subgenus of *Caecum*. LIGHTFOOT (1992) divided the family into different subgenera according to the shape of the mucro, and formulated the diagnosis of subgenus *Brochina* as follows: "coin-edge mucro, variable projection; septum often blistered, inflated to ungulate." BANDEL (1996) characterized the subgenus *Brochina* Gray, 1857 by its smooth teleoconch, with delicate longitudinal striae, and circular aperture.

The generic and subgeneric concepts within this family are still not clearly defined. MOORE (1962) expressed concern about the taxonomic status of the species, noting the disorder created because most authors have failed to characterize intraspecific variability, thus generating a large number of synonyms. This regrettable practice has continued, as reported by VAN AARTSEN (1977), ABSALÃO (1997), ABSALÃO & GOMES (1995) and GOMES & ABSALÃO (1996).

Turning to the representatives of the family along the Brazilian coast, de Folin was the first to describe a Brazilian *Caecum*. Between 1867 and 1874, de Folin recognized among his "smooth" taxa, eight valid species and four varieties (KISCH, 1959). DUNKER (1875) described *C. corneum*, but only three-quarters of a century late did LANGE-DE-MORRETES (1949) discuss the family in his catalogue of Brazilian mollusks. LANGE-DE-MORRETES (1954) described *C. berthae,* and RIOS (1970, 1975, 1994), MELLO & MAE-

Figures 1-6. 1, 2. *Caecum lineicinctum* holotype, BMNH 1887.2.9.2314. 2. Posterior region. 3, 4. *Caecum subvolutum* lectotype herein designated, MNHN. 4. Posterior region. 5, 6. *Caecum lineicintum*, MORG 20113. 6. Posterior region. Scale bars. Figs. 1, 3 and 5: 500 µm; figs. 2, 4 and 6: 100 µm.

STRATI (1986), ABSALÃO (1994, 1997), ABSALÃO & GOMES (1995), and GOMES & ABSALÃO (1996) also reported on Brazilian Caecidae.

Presently, eight species in Brazil are assigned to the subgenus *Brochina* (see RIOS, 1994): *Caecum achironum* (de Folin, 1867); *C. antillarum* Carpenter, 1858; *C. circumvolutum* de Folin, 1867; *C. johnsoni* Winkley, 1908; *C. multicostatum* de Folin, 1867; *C. striatum* de Folin, 1868; *C. strigosum* de Folin, 1867; and *C. subornatum* de Folin, 1874. The present study revises the taxonomy of these species as a first step toward a complete revision of the Brazilian Caecidae. We intend eventually to extend this revision to the remaining western Atlantic species.

MATERIAL AND METHODS

The following abbreviations are used: ANSP, Academy of natural Sciences of Philadelphia; BMNH: The Natural History Museum, London; FLMNH: Florida Museum of Natural History, Gainesville, Florida; GEOMAR: Oceanographic expedition from Brazilian navy on Marine Geology; IB-UFRJ: Instituto de Biologia da Universidade Federal do Rio de Janeiro. Rio de Janeiro, Brazil; MCZ: Museum of Comparative Zoology, Cambridge, Massachussetts; MNHN: Muséum Natinoal d'Histoire Naturelle, Paris; MORG: Museu Oceanográfico Prof. Eliézer de Carvalho Rios, Rio Grande, Rio Grande do Sul, Brazil; ZMA: Zoologish Museum Amsterdam, Amsterdam, The Netherlands.

Brazilian material was identified according to the original descriptions and checked by conchological comparison with material (especially types) held at the above institutions. All the material was illustrated by SEM photographs, after sputter-coating with gold (see BANDEL, 1996, for details). The total length was measured including both septum and mucro.

RESULTS AND CONCLUSIONS

Family Caecidae Gray, 1850
Subgenus *Brochina* Gray, 1857
Type: *glabrum* Montagu, 1803.

***Caecum lineicinctum* de Folin, 1879**
(Figs. 1 and 2)

C. lineicinctum de Folin, 1879: 808-809; MOORE, 1972: 884, figs. 3-5; KEELER, 1981: 69, fig. l0; LIGHTFOOT, 1992a: 184, fig. 20.

Shell medium in size, reaching 3 mm in length, moderately and regularly curved throughout the shell. The caliber is practically the same except for some weak rounded rings, only visible in the anterior region. Mammillated septum, partially retracted, mucro distinct with slight dorsal concavity and blunt edge.

Material Examined: *C. lineicinctum*: BMNH 1887.2.9.2314 holotype, St. Thomas, West Indies; MORG 20113, Abrolhos, Brazil, 1978; MORG 26240 Ilha Guarita, Abrolhos - BA, Brazil, 1978. *C. subvolutum*: MNHN syntypes, Barbados; FLMNH 236013, SW Egmont Key, Florida, 1962.

Remarks: The eroded condition of the type did not allow precise identification. It was impossible to determine the constriction, the extension of rings towards the posterior end, or the presence or absence of an aperture varix. MOORE (1972: 886, fig. l) interpreted the holotype of *C. lineicinctum* de Folin, 1879 (*sic*) as a young specimen, and illustrated another specimen with a varicose aperture. He also discussed the differences between *C. lineicinctum* de Folin, 1879 and *C. subvolutum* de Folin, 1867 (Figs. 3 and 4), their closest conchological relations, based on septum and mucro differences and the extent and intensity of the ring sculpturing. Although LIGHTFOOT (1992a: 172) considered the septum and mucro variability, she emphasized the mucro of *C. lineicinctum* as a diagnostic character, defining it as a narrow finger-shape with a large blunt ball at its top.

In addition to these characters, Moore considered *C. lineicinctum* as being wider than *C. subvolutum*. In Table 1 we compare the length/width (l/w) ratio of the type of each species, and of the specimens studied by MOORE (1972), LIGHTFOOT (1992a, b), and KEELER (1981).

The specimen illustrated by LIGHTFOOT (1992b: 23, fig. 25) as *C. subvolutum* is actually *C. circumvolutum*, since it lacks the mammillated mucro of *C. subvolutum*. It seems that Lightfoot misunderstood the concepts of these two species, since of the 13 lots labelled by her as *C. subvolutum*, only 1 was correctly identified (see Table 1); all the others were *C. circumvolutum* de Folin, 1867.

C. lineicinctum has a very characteristic finger-shaped mucro, and differs from *C. subvolutum* in the apertural ring sculpture, the shape of the anterior region, and the width of the shell. When the photographs of the types of both species are compared, the septum and mucro differences are not very evident because of the erosion in the holotype of *C. lineicinctum*. We have not found *C. subvolutum* in Brazilian waters. The Brazilian form of *C. lineicinctum* (Figs. 5 and 6) differs from the holotype figured by MOORE (1972) and LIGHTFOOT (1992a: 184, fig. 20) specimen in the weakness of the ring sculpturing near the aperture and the presence of irregular growth lines.

***Caecum strigosum* de Folin, 1867**
(Figs. 7 and 8)

Caecum strigosum de Folin, 1867: 53, pl. 5, fig. 5; LYONS, 1989: pl. 3, fig. 13; LIGHTFOOT, 1992b: 28, fig. 31; RIOS, 1994: 57, pl. 18, fig. 208; LEAL, 1991: 321, pl. 13, figs. h-i.

Caecum striatum de Folin, 1868: 49, pl. 5, fig. 3.

Caecum strigosum var. obsoleta de Folin, 1874: 212.

Caecum antillarum Carpenter, 1858. KEELER, 1981: 71, fig.18; RIOS, 1994: 56, pl.18, fig. 203.

Shell small (1.5 mm), moderately and regularly curved. Anterior region with diameter greater than remainder of shell. Adult specimens may show a slight swelling just behind the aperture. Shell surface smooth, but under high magnification (about 200 x), longitudinal microstriae visible all over the shell. Septum hemispheric, mucro tiny and blunt, in left lateral-dorsal position.

Material Examined: *Caecum strigosum*: MNHN syntypes, Rio de Janeiro and Pernambuco, Brazil; IB-UFRJ 7434 Geomar XII #29, Brazil, 1979. *C. striatum*: MNHN syntypes Bahia and Pernambuco, Brazil, and Panama; IB-UFRJ 7433 Geomar XII #19, Brazil, 1979; IB-UFRJ 7493 Ribeira - BA, Brazil, 1994; IB-UFRJ 8457 Geomar XII #53, Brazil, 1979; IB-UFRJ Geomar XII #56, Brazil, 1979; IB-UFRJ 7432 Ribeira - BA, Brazil, 1994.

Remarks: de Folin's original illustration and the specimens illustrated by MELLO & MAESTRATI (1986) show a constriction in

Figures 7-12. 7, 8. *Caecum strigosum* lectotype herein designated, MNHN. 8. Posterior region. 9, 10. *Caecum striatum*, lectotype herein designated, MNHN. 10. Sculpture pattern. 11, 12. *Caecum antillarum* holotype, BMNH 1858.12.9.23. 12. Posterior region. Scale bars. Figs. 7 and 9: 500 mm; figs. 8 and l0: 100 µm; fig. 11: 250 µm; fig.12: 50 µm.

the posterior extremity. Only one of the syntypes shows this character. We conclude that this is an individual variation rather than a species character. If we disregard this constriction as typical for the species, there are many similarities between *C. striatum* and *C. strigosum* de Folin, 1867. These similarities led LEAL (1991: 321, pl. 13, figs. h-i) to illustrate *C. striatum* as *C. strigosum*. Both species show the same kind of sculpturing, but in *C. strigosum* this sculpturing is thinner than in *C. striatum* (Figs. 9 and 10) and is visible only under high magnification. The main distinctive characteristic of *C. strigosum* is the swelling next to the aperture, which de Folin exaggerated in his figure. Actually the swelling is subtle, and is observed only in adult specimens. If we consider the conchological variability found in the family Caecidae, especially the changes from young to adult stages (BANDEL 1996), we are led to the conclusion that *C. striatum* is actually a young individual of *C. strigosum*, which would develop the anterior swelling at sexual maturity. Knowledge of the anatomy of the soft parts may help to support this proposed synonymy, but such information is not yet available for most species in the family.

***Caecum antillarum* Carpenter, 1858**

(Figs. 11 and 12)

Caecum antilarum Carpenter, 1858: 433; BANDEL,1996: pl. 3, figs. 4 and 5; DE JONG & COOMANS, 1988: 38; KEELER, 1981: 71, fig. 18. *Caecum subornatum* de Folin, 1874: 212, pl. 9, fig. 5.

Caecum vestitum de Folin, 1870: 183-184, pl. 25, figs. 3-4; KEELER, 1981: 70, fig. 17.

Caecum johnsoni Winkley, 1908. KEELER, 1981: 71, fig. 20; LIGHTFOOT, 1992b: 28, fig. 32.

Shell small (2.6 mm) to medium in size (3.5 mm), moderately curved but strongly curved in the aperture end, usually with a slight increase in the caliber towards the aperture. Surface of shell may be smooth or with very weak growth rings, these rings more visible near the aperture and becoming obsolete posteriorly. No varix or swelling present. Hemispheric septum; mucro, when visible, blunt and low.

Material Examined: *Caecum dextroversum antillarum*: BMNH 1858 12.9.23 holotype; West Indies. *Caecum subornatum*: MNHN syntypes, Brazil. *Caecum johnsoni* FLMNH 267514, USA; FLMNH 267489 Bermuda Id., Howard Beach.

Remarks: The main problem regarding this species is the badly eroded condition of the holotype, which renders it impossible to observe the microscopic annular sculpturing. Furthermore, it is an immature specimen without the typical deflection at the apertural end easily visible in adult shells, e.g., FLMNH 267514 (Fig. 13) and Brazilian material IB-UFRJ 7425 (Fig. 14). Superficially, *C. antillarum* Carpenter, 1858 is similar to *C. striatum*, but the longitudinal microsculpturing is lacking. Except for slight annular sculpturing near the aperture, the shell is almost completely smooth. BANDEL (1996: pl. 2, fig. 6; pl. 3, fig. 4 - 6) figured *C. antillarum* and *C. vestitum* at various growth stages. Neither of the adult stages illustrated by BANDEL (1996: pl. 3, figs. 5 and 6) is similar to the respective types. Actually the *C. antillarum* illustrated by BANDEL (1996, pl. 3, fig. 6) is most similar to the syntypes of *C. vestitum* (figs. 15 and 16); Bandel possibly inadvertently reversed the captions. In the original description of *C. antillarum*, CARPENTER (1858) did not indicate the presence of rings near the somewhat constricted aperture. On the other hand, de Folin's (1874) illustration of *C. subornatum* clearly shows rings near the aperture, exactly as in our SEM photographs of the lectotype (Figs. 17, 18 and 19). Other than these differences, there is no distinctive characteristic separating these two types. This strongly suggests that the type of *C. antillarum* is in fact an immature specimen. We believe that both belong to the same species. The shell figured by BANDEL (1996, pl. 3, fig. 5) as *C. antillarum* may be a typical *C. subornatum* de Folin, 1874. DE JONG & COOMANS (1988) discussed the same species, and mentioned (but without providing illustrations) that some specimens show weak rings in the anterior region. The material that DIAZ & PUYANA (1994: 121; pl. 26, fig. 18) and VOKES & VOKES (1984: 121, pl. 26, fig. 18) illustrated as *C. antillarum* is actually *C. ryssotitum*, which is characterized by the smooth and swelling shell with a constricted aperture. RIOS (1994) reported that a varix is not present in *C. antillarum*.

***Caecum achironum* de Folin, 1867**

(Figs. 20 and 21)

Caecum achironum de Folin, 1867: 57, pl. 3, fig. l; RIOS, 1994: 56, pl. 18, fig. 202.

Caecum achironum var. striata de Folin, 1867: 57, pl. 3, fig. 2.

Shell medium in size (3.0 mm length), with slight regular curvature throughout the shell. Caliber increasing towards aperture. No terminal varix present. Shell surface sculptured by longitudinal microstriation interrupted by growth lines. Septum much produced and tongue-like (unguiculate) and blunt; mucro weakly projecting.

Material Examined: *Caecum achironum*: MNHN syntypes, Pernambuco and Bahia, Brazil.

Remarks: *Caecum achironum* was described by de Folin with two varieties: *C. achironum* var. *someri* and *C. achironum* var. *striata*. Conchologically *C. achironum* s.s. and *C. achironum* var. *striata* are identical, and at first sight they should be considered as a synonym. Our observations indicate that *C. someri* (see below) is a common species in Brazilian waters, while *C. achironum* de Folin, 1867 is rare. *C. someri* is not a sculptured form of *C. achironum s.s.*, as might be expected. The surface of *C. someri* is always smooth and shiny, with no signs of erosion. MELLO & MAESTRATI (1986) also recognized both species as valid, but did not discuss the diagnoses.

***Caecum someri* de Folin, 1867**

(Figs. 22 and 23)

Caecum someri de Folin, 1867: 56, pl. 3, fig. 2; MELLO & MAESTRATI, 1986, p. 157, fig. 12; GOMES & ABSALÃO, 1996: 518, fig. 6.

Caecum achironum de Folin, 1867; 56, pl. 3, fig. 1. LIGHTFOOT, 1992b: 24, fig. 24; RIOS, 1994: 56, pl. 18, fig. 202.

Shell medium in size (3.0 mm), with a slight, even curvature throughout the shell. Caliber increasing moderately towards aperture. Shell surface smooth and shiny. No terminal varix. Septum greatly produced and tongue-like (unguiculate); mucro blunt and weakly projecting.

Material Examined: *Caecum someri*: MNHN syntypes, Pernambuco, Brazil; IB-UFRJ 7428 Geomar XII #55, 1979; IB-UFRJ 7383 Geomar XII #97, 1979; IB-UFRJ 7363 Geomar XII #43,

Figures 13-19. 13. *Caecum antillarum* (smooth pattern), FLMNH 267514. 14. *Caecum antillarum*, IB-UFRJ 7425, anterior region. 15, 16. *Caecum vestitum* lectotype herein designated, MNHN. 16. Posterior region. 17-19. *Caecum subornatum* lectotype herein designated, MNHN. 18. Posterior region. 19. Anterior region. Scale bars. Figs. 13 and 18: 50 µm; figs. 16 and 19: 100 µm; figs. 14 and 17: 200 µm; fig. 15: 500 µm

1979; IB-UFRJ 7376 Geomar XII #67, 1979; IB-UFRJ 7392 Geomar XII #51, 1979; IB- UFRJ 7385 Geomar XII #49, 1979; IB-UFRJ 7391 Geomar XII #85, 1979; IB-UFRJ 7367 Geomar XII #50, 1979; IB-UFRJ 7431 Geomar XII #85, 1979; IB-UFRJ 7368 Geomar XII # 42, 1979; IB-UFRJ 7372 Geomar XII #56, 1979; IB-UFRJ 7364 Geomar XII #75, 1979; IB-UFRJ 7371 Geomar XII #104, 1979; IB-UFRJ 7379 Geomar XII #65, 1979; IB-UFRJ 7402 Geomar XII #71, 1979; IB-UFRJ 7370 Geomar XII #68, 1979; IB-UFRJ 7430; Geomar XII #26, 1979; IB-UFRJ 7365 Geomar XII #69, 1979; IB-UFRJ 7390 Geomar XII #51, 1979; IB-UFRJ 7375 Geomar XII #53, 1979; IB-UFRJ 7389 Geomar XII #79, 1979; IB-UFRJ 7395 Geomar XII #37, 1979; IB-UFRJ 7419 PITA, Macaé, 1993; IB-UFRJ 7382 Geomar XII #55, 1979; IB-UFRJ 7366 Geomar XII #52, 1979; IB-UFRJ 7386 Geomar XII #78, 1979; IB-UFRJ 7393 Geomar XII #51, 1979; IB-UFRJ 7396 Geomar XII #46, 1979; IB-UFRJ 7377 Geomar XII #132, 1979; IB-UFRJ 7397 Geomar XII #80, 1979; IB-UFRJ 7374 Geomar XII #73, 1979; IB-UFRJ 7381Geomar XII #102, 1979; IB-UFRJ 7380 Geomar XII #70, 1979; IB-UFRJ 7429 Geomar XII #80, 1979; lB-UFRJ 7369 Geomar XII #86, 1979; IB-UFRJ 7394 Geomar XII #81, 1979; IB-UFRJ 7373 Geomar XII #74, 1979; IB-UFRJ 7384 Geomar XII #65, 1979; IB-UFRJ 7378 Geomar XII #71, 1979; IB-UFRJ 7388 Geomar XII #45, 1979, all from Brazil.

Remarks: Lightfoot (19920b: 24) illustrated a smooth shell as *Caecum achironum*. It appears that this is *Caecum someri* (Fig. 22).

Caecum circumvolutum **de Folin, 1867**
(Figs. 24 and 25)

Caecum circumvolutum de Folin, 1867: 29, pl. 3, fig. 3; Mello & Maestrati, 1986: 155, fig. l0; Rios, 1994: 56, pl. 18, fig. 204; Gomes & Absalão, 1996: 518, fig. 4.

Caecum limpidum de Folin,1874: 211-212.

Caecum buccina de Folin, 1870: 184-185, pl. 25, figs. 7-8.

Caecum carmenensis de Folin, 1870: 184, pl. 25, figs. 5-6.

Caecum veracruzanum de Folin, 1870: 183, pl. 25, figs. 1-2.

Caecum rijgersmai De Jong & Coomans, 1988: 170, pl. 2, fig. 171.

Caecum vestitum de Folin, 1870. Leal, 1991: 13, figs. J-K.

Caecum subvolutum de Folin, 1867. Lightfoot 1992b: 23, fig. 23

Shell medium in size (3.2 mm), moderately and regularly curved, cylindrical, caliber increasing regularly towards aperture. Strong and blunt to rounded terminal varix. Weak growth rings may be present. Remainder of shell smooth and shiny. Septum mammillated, somewhat retracted, mucro is a dorsal projection, deviating to the right, and acuminate.

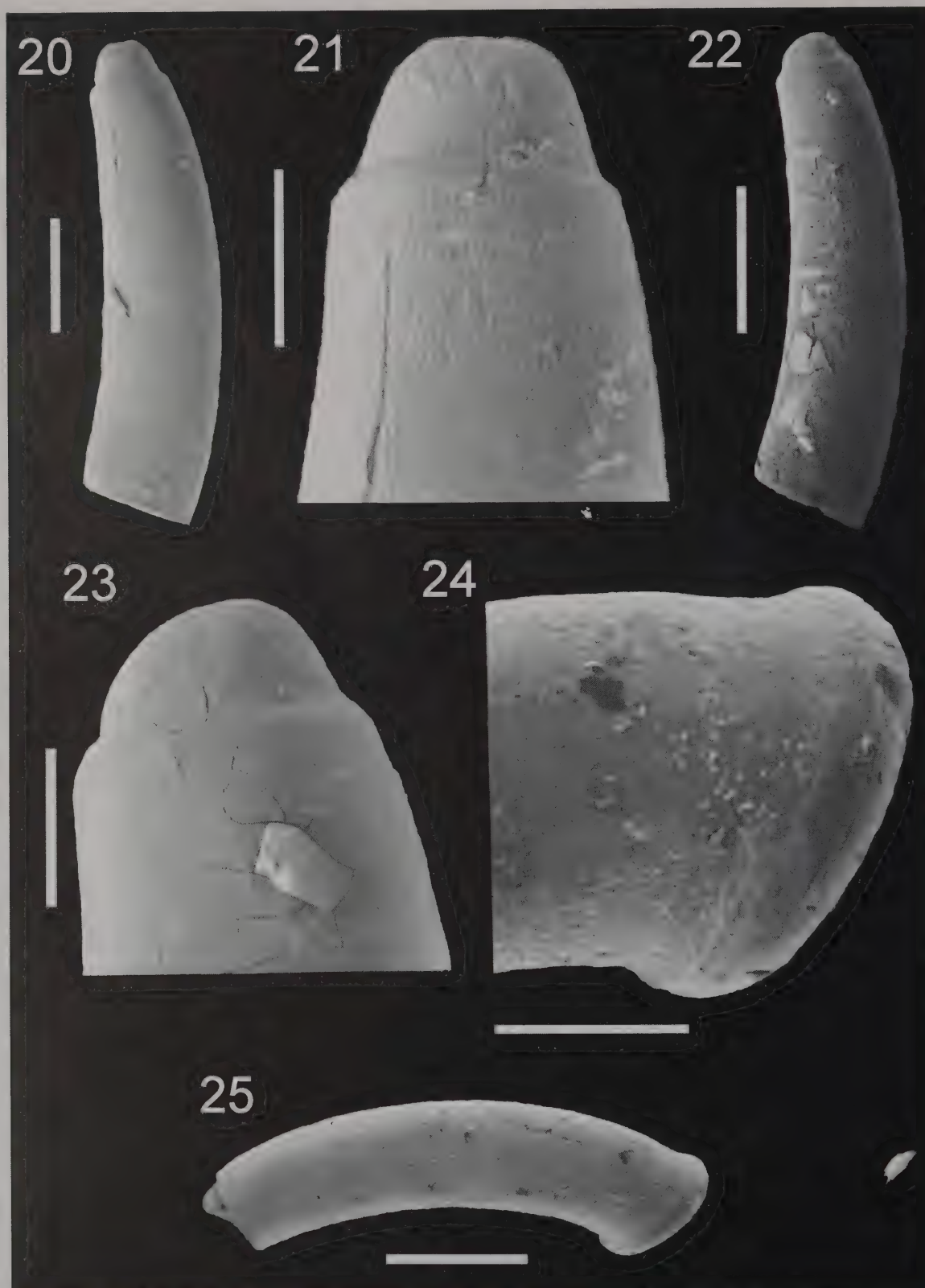
Material Examined: *Caecum circumvolutum*: IB-UFRJ 7291 Geomar XII #32, Brazil, 1979; IB-UFRJ 7409 Ribeira - BA, Brazil,1994; IB-UFRJ 7285 Geomar XII #61, Brazil, 1979; IB-UFRJ 7406 Natal - RN, Brazil, 1992; IB-UFRJ 7422 Abrolhos - BA, Brazil, 1993; IB-UFRJ 7994 Pernambuco, Brazil, 1992; IB-UFRJ 7286 Geomar XII #56, Brazil, 1979. *Caecum limpidum*: MNHN syntypes, Côtes du Bresil. *Caecum buccina*: MNHN syntypes, Vera Cruz. *Caecum carmenensis*: MNHN syntypes, Carmen, Vera Cruz. *Caecum veracruzanun*: MNHN syntypes, Vera Cruz. *Caecum subvolutum*: FLMNH 267496 Virgin Ids., St. Croix, 1987; FLMNH 267491 Palm Beach, Florida, 1973-1980; FLMNH 267492 West Sarasota, Florida, 1976; FLMNH 267486 Trinidad & Tobago; FLMNH 267489 Tucker Town Bay, Bermuda, 1989; FLMNH 267488 Cancun, Mexico; FLMNH 267487 Trinidad & Tobago, 1992; FLMNH 267497 Exuma Id., Bahama, 1992.

Remarks: This species has been synonymized (Mello & Maestrati, 1986; Rios, 1994) or confounded (Leal, 1991) with *Caecum vestitum*. Figure 15 shows the lectotype (herein designated) of *C. vestitum*. Although there is a considerable similarity between it and *C. circumvolutum*, the septum of *C. vestitum* is hemispheric and not mammillated as in *C. circumvolutum* (Fig. 25). The mucro of *C. vestitum* is almost obsolete and barely visible as a blunt projection, while in *C. circumvolutum* it is a small but distinct pointed "beak". In general *C. circumvolutum* increases its caliber gradually towards the aperture, while in *C. vestitum* there is practically no alteration in the caliber, except for the abrupt constriction just before the septum. The terminal varix of *C. circumvolutum* is a large round/blunt swelling like that of *C. vestitum*, but in the latter the varix is much weaker and always preceded by a few low rings. We consider these species distinct. The illustration by Vokes & Vokes (1984, pl. 26, fig. 20) of "*C. vestitum*" is unidentifiable. *C. vestitum* has not been found in Brazilian waters. All eight individuals of the type series of *C. buccina* are immature, and show two growth stages. There is a constriction separating these two stages, formed by the abrupt increase of the shell during the late growth stage. Thus it is not possible to see any swelling near the aperture, which is characteristic of adult individuals. The types of *C. carmenensis* (Figs. 26, 27, 28 and 29) are immature, with fused growth stages, and show a slight increase in caliber towards the aperture. As noted by Dr. Pizzini (personal communication, 1998) *C. carmenensis* as illustrated in figures 28 and 29 is quite similar to *C. cuspidatum* Chaster, 1896 (type locality: Tangiers, Morocco, western Sahara). It is our intention to treat the eastern Atlantic species separately in the future. The problem is more complicated when we examine *C. veracruzanum* (Fig. 30), because all 37 individuals in the type series are short and wide, with no swelling near the aperture, as if they had reached the last growth stage but failed to reach maturity (indicated by the presence of the aperture varix). *C. limpidum* (Fig. 31), *C. buccina*, *C. carmenensis,* and *C. veracruzanum* we considered synonyms of *C. circumvolutum*. This synonymy enlarges the distribution of *C. circumvolutum* from Florida, the Gulf of Mexico, and the Caribbean Sea south to Brazil. *C. rijgersmai* is absolutely identical to *C. circumvolutum.* Despite the brief description and confusing illustrations, there is no doubt of this synonymy. De Jong & Coomans (1988) failed to compare their taxon, which is more common in the Caribbean Sea, to any of the above taxa (see also *C. marmoratum* below).

Caecum multicostatum **de Folin, 1867**
(Figs. 32, 33 and 34)

Caecum multicostatum de Folin, 1867: 32, pl. 3, figs. 4,5. Mello & Maestrati, 1986: 158, fig, 13.

Caecum venosum de Folin, 1867: 46. Gomes & Absalão, 1996: 520, figs. 8, 9.

Caecum heladum Olsson & Harbison, 1954. Keeler, 1981: 71, fig. 19; Lyons, 1989: pl. 3, fig. l0; Lightfoot 1992b: 24, fig. 25; Abbott, 1974: 93, fig. 886; Vokes & Vokes, 1984: pl. 26, fig. 19.

Figures 20-25. 20, 21. *Caecum achironum* lectotype herein designated, MNHN. 21. Posterior region. 22, 23. *Caecum someri* lectotype herein designated, MNHN. 23. Posterior region. 24, 25. *Caecum circumvolutum*. 24. Anterior region. Scale bars. Figs. 20 and 22: 500 µm; figs. 21 and 24: 200 µm; figs. 23 and 25: 100 µm.

Caecum johnsoni Winkley, 1908: 54; MORSE, 1919: 75, fig. 3.

Shell reaching 2 mm in length, moderately curved, with a slight swelling behind the aperture. Diameter constant. Sculpturing with short longitudinal cords as wide as the interspaces. Microlongitudinal striation covering cords and interspaces. Aperture with rings over the swelling. Septum hemispheric rugosely mammillate; mucro blunt, projecting dorsally, and directed left.

Material Examined: *Caecum johnsoni*: MCZ 33917 paratypes; FLMNH 267514 Sarasota Co., Florida, USA, 1985; FLMNH 267511 Martin Co. Florida, USA, 1991; FLMNH 267512 St. Johns Co. Florida, USA, 1972; FLMNH 231533 Bocas dei Tara, Panama; FLMNH 267498 Tobago Id., USA, 1992; FLMNH 00125837 Franklin Co., Florida, USA; FLMNH 267516 Bermuda Ids, USA, 1989; FLMNH 267515, Franklin Co, Florida, USA, 1988; IB-UFRJ 7425 Geomar XII #101, 1979; IB-UFRJ 7292 Geomar XII #74, 1979. *Caecum heladum*: FLMNH 267520 Florida, USA, 1972; FLMNH 267517 Bermuda Ids, USA, 1989; FLMNH 267522 Martin Co. USA; FLMNH 267524 Florida, USA, 1991; FLMNH 267519 Florida, USA, 1986; FLMNH 176713 Palm Beach Co. USA, 1951; FLMNH 267527 Florida, USA, 1974; FLMNH 267518 Tobago Id; Off Scarborough, 1991; FLMNH 231527, Panama, 1951; FLMNH 267526 Sarasota Co., USA, 1976; FLMNH 267521 Martin Co., Florida, 1989; FLMNH 267523 Palm Beach Co., USA, 1973-1980; FLMNH 267525 Sarasota Co., Florida, USA, 1985. *Caecum venosum*: MNHN syntypes, Pernambuco, Brazil; IB-UFRJ 7426 Guarajuba - BA, Brazil, 1993; IB-UFRJ 7448 Pernambuco, Brazil, 1993; IB-UFRJ 7290 Geomar XII #32, Brazil, 1979; IB-UFRJ 7404 Ribeira - BA, Brazil, 1994; IB-UFRJ 7446 Bahia, Brazil, 1994; *Caecum multicostatum*: MNHN syntypes, Brazil, Venezuela, Mexico.

Remarks: It is clear from inspection of the holotype of *C. venosum* (Figs. 35 and 36), that the species was described based on a broken shell with the anterior third missing. Thus the characters of the anterior region are not available for comparison. On the other hand, the longitudinal sculpturing and the septum are the same as in *C. multicostatum* (Fig. 32). For this reason, we propose that *C. venosum* be synonymized with *C. multicostatum* de Folin, 1867. The original description of *C. multicostatum* did not mention the type locality, but the original label assigned it to Brazil, Venezuela, the Dutch Antilles, and the Gulf of Mexico. We designate the type locality as Brazil, specifically the coastal state of Pernambuco, where M. de Somer was visiting the country as a naval commander and took shell samples. According to MELLO & MAESTRATI (1986), *C. multicostatum* is reticulated, but the illustrations of the lectotype and paralectotype do not show this feature. The longitudinal sculpture is much stronger than the rings, except near the aperture.

Comparison of *C. johnsoni* (Figs. 39, 40 and 41) with *C. multicostatum* is difficult, because the paratypes of the former are poorly preserved. MORSE (1919) illustrated a co-type of *C. johnsoni*, which is smooth with transverse lines of growth, and has a sub-ungulate septum. According to MORSE (1919), it resembles the figure in Tryon of *C. achironum* de Folin. We have had no opportunity to examine this material until now, but it scarcely matches the paratypes illustrated here. Probably the material examined by MORSE (1919) was poorly conserved or had elements of two species intermingled.

The longitudinal cords of both species are the same, but the microlongitudinal striation sculpturing present in *C. multicostatum* is undetectable in *C. johnsoni*, and the swelling behind the aperture, characteristic of mature individuals, is not present in the paratypes of *C. johnsoni*.

Despite the differences in L/W ratios between *C. johnsoni* and *C. multicostatum,* we can draw no conclusions, as we had only three individuals in each type series to measure (Table 2). VOKES & VOKES (1984, pl. 26, fig. 19) reported the occurrence of *C. heladum* Olsson & Harbison, 1954 in Recent deposits of the Yucatan Peninsula, even though this species was described based on fossil material from Florida. The study of *C. heladum* (Figs. 37 and 38) clarified questions related to intrapopulational variability of the L/W ratio and the expression of the longitudinal and annular sculpturing. As an example, VOKES & VOKES (1984) illustrated a specimen of *C. heladum* in which the ring sculpturing predominated over the longitudinal sculpturing, but examination of the original illustrations and the syntypes of this taxon demonstrates the existence of considerable variability of these characters. Furthermore, the L/W measurements of *C. heladum* overlap those of *C. johnsoni* and *C. multicostatum* (Table 2).

Initially we were hesitant about synonymizing the Pliocene *C. heladum* with a Recent species, but we noted that *C. heladum* had already been assigned as a Recent species (ABBOTT, 1974; KEELER, 1981; VOKES & VOKES, 1984; LYONS, 1989; LIGHTFOOT, 1992b). *C. carolinianum* Dall, 1892, a Pliocene species of North Carolina, was also reported by ABBOTT (1974), KEELER (1981), and LIGHTFOOT (1992a) from the Recent. Thus, considering the range of variation of the shell characters of the species concerned, it is impossible to establish distinct boundaries among *C. heladum*, *C. johnsoni*, and *C. multicostatum*. We therefore conclude that *C. johnsoni*, *C. multicostatum*, and *C. heladum* belong to the same taxon.

RIOS (1994) proposed that *C. heladum* Olsson & Harbison, 1954 is a synonym of *C. striatum*; this proposal is clearly erroneous.

Caecum marmoratum de Folin, 1870

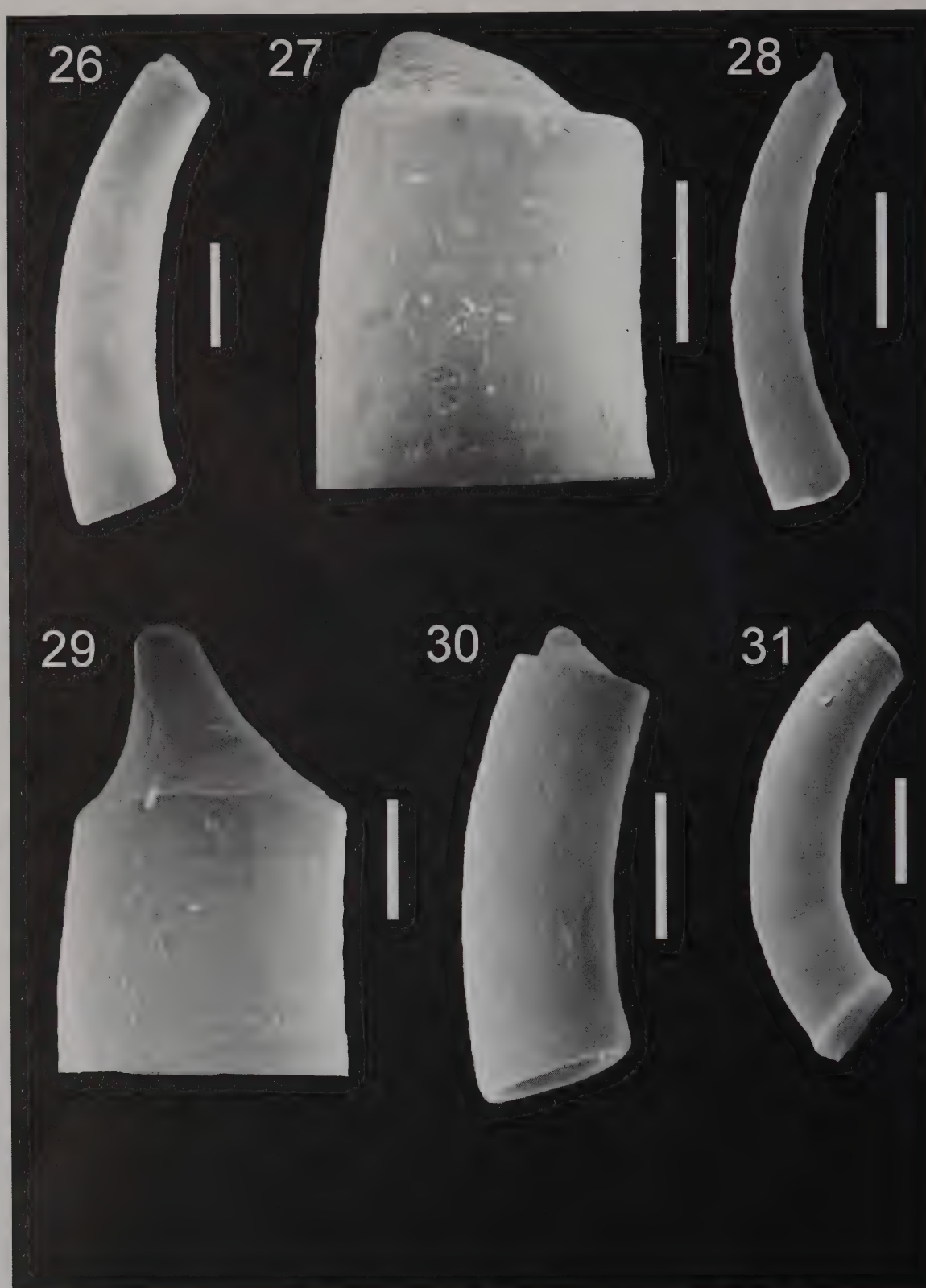
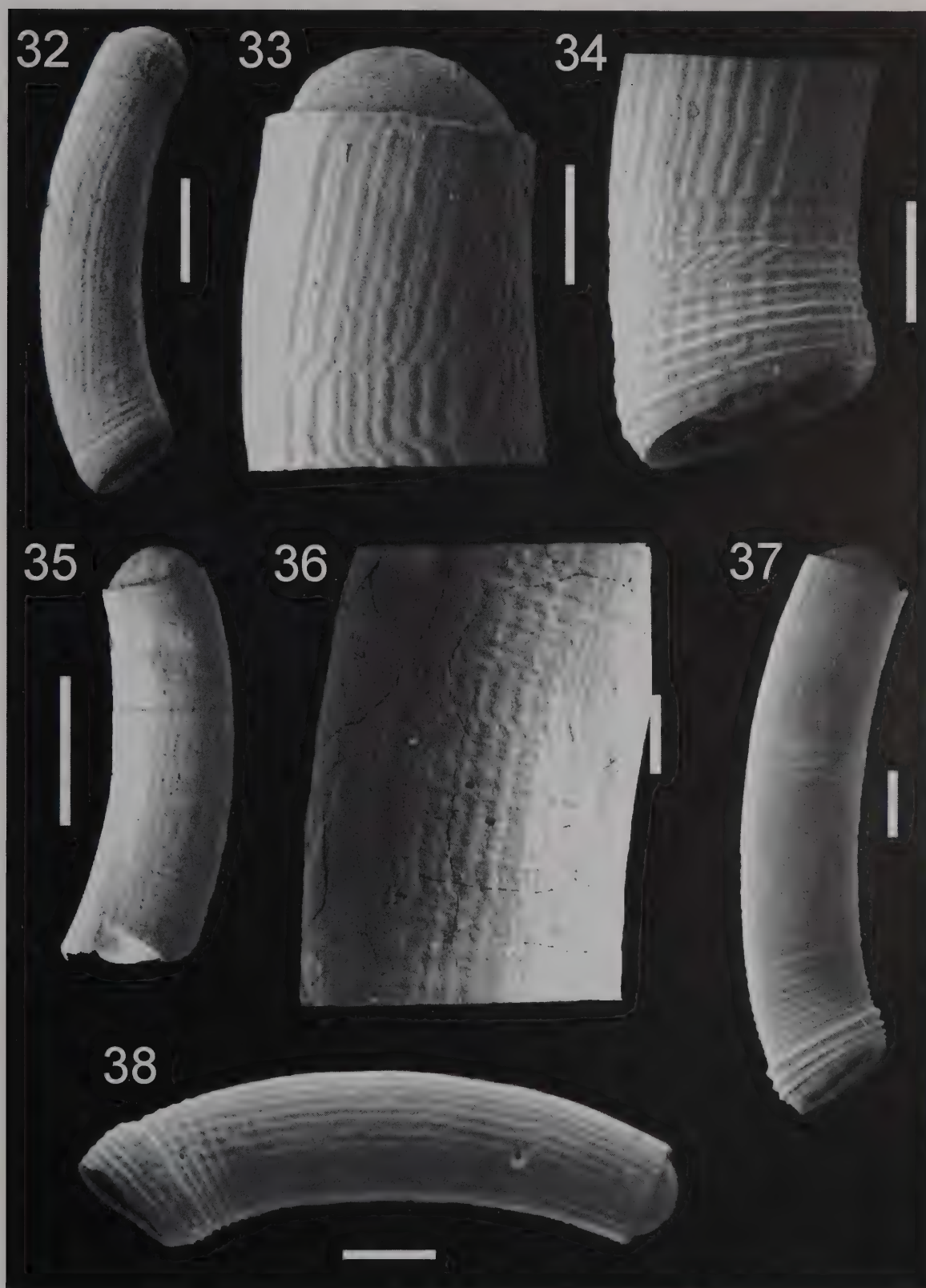
(Figs. 43 and 44)

Caecum marmoratum de Folin, 1870: 126, pl. 15, figs. 1, 2.

Caecum butoti De Jong & Coomans, 1988: 39, fig. 177; ABSALÃO & GOMES, 1995: 211, fig. 1 a, b).

Caecum antillarum Carpenter, 1857. VOKES & VOKES, 1984: 121, pl. 26, fig. 18.

Shell medium in size, reaching 2.4 mm in length; curvature moderate, accentuated anteriorly. Caliber increasing moderately towards anterior region, greatest in apertural region. Live individuals brownish with irregular white bands. Surface completely smooth. Aperture slightly constricted. Septum mammillated and retracted. Mucro a blunt triangular projection.

Material examined: *Caecum butoti*: IB-UFRJ 6499 Aruba and West Indies; IB-UFRJ 7353 Geomar XII #8, Brazil, 1979; IB-UFRJ 7403 Geomar XII #71, Brazil, 1979; IB-UFRJ 7359 Geomar XII #114, Brazil, 1979; IB-UFRJ 7362 Geomar XII # 61, Brazil, 1979; IB-UFRJ 7400 Geomar XII #97, Brazil, 1979; IB-UFRJ 7358 Geomar XII #120, Brazil, 1979; IB-UFRJ 7360 Geomar XII #9, Brazil, 1979; IB-UFRJ 7357 Geomar XII #114, Brazil, 1979; IB-UFRJ 6865 Geomar XII #5, Brazil, 1979; IB-

Figures 26-31. **26, 27.** *Caecum carmenensis* lectotype herein designated, MNHN. 27. Posterior region. **28, 29.** *Caecum carmenensis* young, paralectotype herein designated, MNHN. 29. Posterior region. **30.** *Caecum veracruzanum*, lectotype herein designated, MNHN. **31.** *Caecum limpidum*, lectotype herein designated, MNHN. Scale bars. Figs. 26, 28, 30 and 31: 500 µm; fig. 27: 200 µm; fig. 29: 100 µm.

Figures 32-38. 32-34. *Caecum multicostatum* lectotype herein designated, MNHN. 33. Posterior region. 34. Anterior region. **35, 36.** *Caecum venosum* holotype MNHN. 36. Sculpture pattern. **37, 38.** *Caecum heladum* syntypes, ANSP 19007. Scale bars. Figs. 32, 35, 37 and 38: 500 µm; fig. 33: 200 µm; figs. 34 and 36: 100 µm.

Figures 39-44. 39-41. *Caecum johnsoni* paratype MCZ 33917. 40. Septum/mucro view. 41. Posterior region. 42. *Caecum butoti* from Brazilian waters, IB-UFRJ 6499. 43, 44. *Caecum marmoratum* holotype, MNHN (accidentally destroyed). 44. Posterior region. Scale bars. Fig. 39: 500 μm; fig. 40: 100 μm; figs. 41 and 43: 200 μm; fig. 44: 250 μm; fig. 42: 1000 μm.

UFRJ 7502 Cabo Frio VII, Brazil, 1983; IB-UFRJ 8482 Geomar XII #7, #22, #124, Brazil, 1979; IB-UFRJ 7356 Geomar XII #112, #125, Brazil, 1979; IB-UFRJ 7499 Cabo Frio VII, Brazil, 1983; IB-UFRJ 7355 Geomar XII #22, Brazil, 1979; IB-UFRJ 7361 Geomar XII #34, #21, Brazil, 1979; IB-UFRJ 7354 Geomar XII #89, #127, Brazil, 1979. *Caecum dextroversum var. antillarum*: BMNH 1858 12.9.23 holotype, West Indies. *Caecum marmoratum*: MNHN syntypes, Bahamas.

Remarks: Unfortunately the holotype of *C. marmoratum* de Folin, 1870 was destroyed after being photographed (Figs. 43, 44), but it could be compared with Brazilian specimens and positively identified. The original illustration of *C. butoti* (De Jong & Coomans, 1988: 170, pl. 2, fig. 177) is too unclear to support any remarks. However, the holotype was examined (ZMA 387067), as were specimens from the Brazilian coast (Fig. 42). We are confident in assigning *C. butoti* as a synonym of *C. marmoratum*, and propose the holotype of *C. butoti* as the neotype of *C. marmoratum*. The material illustrated by Vokes & Vokes (1984) as *C. antillarum* is actually *C. marmoratum*.

At first sight one might question the conspecific status of *C. butoti* and *C. marmoratum*, since de Folin's original publication showed differences between the two species. To understand our proposal, it is necessary to evaluate de Folin's taxonomic practices. Despite his meticulous descriptions, he exaggerated his drawings more than once, attempting to emphasize tenuous shell differences to readers. For example, compare the original illustration of *Caecum strigosum* de Folin, 1867 with the photograph of the type (Figs. 7 and 8) in this paper. Another example is *C. armoricum*, which was allocated to its own subgenus (*Armata*) by de Folin, because of the "prickles" on the shell surface. It is now known that the "prickles" are extensions of the periostracum, since Moore (1970), after examining the type of *Caecum armoricum* stored at the Muséum National d'Histoire Naturelle, considered the species as a synonym of *Caecum glabra*. For this reason it is essential to consider the descriptions and illustrations of de Folin with great care, and to examine each case individually.

In regard to the differences between the proposed neotype and the destroyed type specimen of *C. marmoratum* (Figs. 43 and 44), we must understand the *sui generis* manner of growth in the Caecinae, with the old posterior end of the shell successively being discarded. During this process, the constancy and degree of the shell sculpturing and the septum and mucro can change. Beyond the natural variability among individuals of the same species, there is also the possibility that the same specimen may show more than one type of sculpturing, according to its age. For example, in 1870 de Folin described *Caecum bipartitum* and *C. triornatum*, which clearly show two kinds of ornamentation. This fact leads us to the conclusion that each part of a shell, if examined in different stages, could provide a basis for allocating the same specimen to different subgenera. Additional examples were provided by PIZZINI (1998, figs. 12 and 13, 16c: *C. neocaledonium*). The septo/mucro region also changes according to shell growth. During the growing processs, a succession of new septa are secreted. For example, the pointed septum of *C. carmenensis* (Fig. 27) is transitory and shows the variability that this character may assume. The discovery of Pizzini *et al.* (1998: 137) about the confection in Caecinae of a temporary septum, morphologically distinct from the semipermanent septa (which remains with the animal until the next discarding of the old shell), is important in supporting this assumption.

Lightfoot (1992) stated that the thickened opening was a sign of sexual maturity, when the animal stops growing. Pizzini *et al.* (1995: 83, figs. 10-13: *C. auriculatum*) and Bandel (1996, pl.8, fig. 3 of *C. plicatum*) proved that this does not actually happen. According to their new view, the presence or absence of a slight constriction near the aperture could be understood as an indication of the growth stage of the individual, not a species-level difference.

Therefore, the subtle differences between the specimen proposed as the neotype, and the holotype of *C. marmoratum* have no significance, in view of the intrinsic variability of the characters. We could also mention the coloration, but once again the variability in Caecinae is great, e.g., Nofroni *et al.* (1997, figs. 109-112: *C. vitreum*; figs. 115-117: *C. clarkii*; figs. 121-125: *C. searliswood,* and figs. 128-133: *C. atlantidis*). The yellowish and white spots that produce an ivoried effect in the shell were present (although faded with age) in the type of *C. marmoratum*, and are also present in the type and paratypes of *C. butoti*. This ivoried effect is not exclusive to *C. marmoratum-butoti*, but is also common in species of *Meioceras*.

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Table 1 : Length/width ratios of *C. lineicinctum* and *C. subvolutum* specimens. * FLMNH 236013

	Caecum lineicinctum	*Caecum subvolutum*
holotype/lectotype	4.21	4.71
Moore's (1972) figures	4.39	5.06
Lightfoot's material	4.65	5.50*
Keeler's (1981) figures	4.20	5.18

Table 2 : L/W ratio measurements from types

Caecum johnsoni	*Caecum multicostatum*	*Caecum heladum*
4.13	4.47	4.95
4.26	4.65	4.17
4.13	4.39	4.35

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Prima segnalazione di *Hinemoa cylindrica* (de Folin, 1879) per il Mediterraneo

Giovanni Buzzurro, André Hoarau, Emanuele Greppi & Jacques Pelorce

KEY WORDS: Pyramidelloidea, Recent, Indopacific, Eastern Mediterranean Sea.

ABSTRACT *Jaminea cylindrica* de Folin, 1879 is recorded for the first time in the Mediterranean Sea. This species is of Indopacific origin. The taxonomy of this species is examined. It is conservatively placed in the genus *Hinemoa* Oliver, 1915, after examination of the nearest taxa in the Pyramidellidae Gray, 1840 (*Jaminia* Brown, 1827 not Risso, 1826, *Chrysallida* Carpenter, 1856, *Pseudoscilla* Boettger, 1901, *Cingulina* A. Adams, 1860, *Oscilla* A. Adams, 1861, *Miralda* A. Adams, 1864, *Monotygma* J. E. Gray, 1847 and *Odetta* de Folin, 1870).

RIASSUNTO Viene segnalato per la prima volta nel Mediterraneo il ritrovamento di *Jaminea cylindrica* de Folin, 1879, specie di provenienza indopacifica. Si approfondisce la tassonomia della specie collocandola prudenzialmente nel genere *Hinemoa* Oliver, 1915, dopo aver visionato i taxa più vicini nell'ambito della famiglia Pyramidellidae Gray, 1840 (*Jaminia* Brown, 1827 non Risso, 1826, *Chrysallida* Carpenter, 1856, *Pseudoscilla* Boettger, 1901, *Cingulina* A. Adams, 1860, *Oscilla* A. Adams, 1861, *Miralda* A. Adams, 1864, *Monotygma* J. E. Gray, 1847 e *Odetta* de Folin, 1870).

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INTRODUZIONE

Sempre più numerose sono le specie di origine indopacifica che migrando attraverso il Canale di Suez trovano le condizioni adatte per vivere e svilupparsi lungo le coste del bacino orientale del Mar Mediterraneo.

Molti lavori di diversi Autori hanno ben descritto questo fenomeno in continua evoluzione segnalando oltre un centinaio di specie aliene (AARTSEN *et al.*, 1989; TRINGALI & VILLA, 1990; BARASH & DANIN, 1992).

Il materiale raccolto dal primo e dal terzo Autore sulle coste sudorientali della Turchia ha dato origine a vari contributi (BUZZURRO & GREPPI, 1994, 1996; BOGI, BUZZURRO & GREPPI, 1995). Ciononostante qualche esemplare è sfuggito ad una precisa determinazione ed è attualmente ancora in fase di studio.

In BUZZURRO & GREPPI (1996: 8) nella lista delle specie rinvenute a Tasuchu si segnala, tra l'altro, il ritrovamento di rari nicchi di *Oscilla sp.*; possiamo ora identificare questa specie in *Jaminea cylindrica* de Folin, 1879.

Descrizione originale

"Testa minutissima, subcylindrica, satis lata, paulò elongata, alba; anfractus embryonales II, obliquis apice occulto; normales III, in longitudine rapide augentes, liris validis spiralibus ornati; ultimo maximo, 1/3 testae aequante; apertura ovata paulò obliqua, margine columellare undulato, intus dentato.

Long.: 1 mm 4; lat.: 0 mm 5.

Très petite espèce, fort jolie et fort bien caractérisée par la position oblique de ses tours embryonnaires dont le sommet parait caché; puis par sa forme presque cylindrique, peu allongée et relativement large. Les tours normaux, au nombre de trois, s'allongent rapidement, en demeurant presque de la même largeur. Ils sont ornès des cordons spiraux proportionnellement fortis et bien exprimés.

L'ouverture est ovale, légèrement oblique; son bord columellaire est ondulé par les courbes qu'il décrit; il est armé, au dedans et vers son milieu, d'une dent assez sensible." (de Folin, 1879: 266).

Possiamo aggiungere che il primo giro della teleoconca presenta due cordoncini spirali nel tratto iniziale e finale dello stesso visibili solo in trasparenza all'interno della spira. Non si nota ombelico.

Gli intervalli appena percettibili appaiono lisci; la protoconca è intorta del tipo C (AARTSEN, 1977).

In ogni caso sebbene il disegno riportato da DE FOLIN (pl. 9, fig. 5) non corrisponda perfettamente alla relativa descrizione possiamo affermare che la descrizione della specie in oggetto ben si addice agli esemplari da noi rinvenuti.

Distribuzione

Il *locus typicus* indicato da de Folin è il Borneo (Mare Cinese meridionale).

Personalmente abbiamo raccolto tre esemplari a Tasuchu (Turchia sudorientale) in detriti costieri a ca 2-8 m di profondità e quattro esemplari nell'isola di M'Tsamboro (Arcipelago di Mayotte, Africa orientale) a livello intertidale.

Altri esemplari attribuibili a questa specie sono stati esaminati nella collezione di I. Nofroni (Roma): 12 conchiglie da Honda Bay, Palawan Island (Filippine), 11 m di profondità e 30 da Meara Island (Filippine), 15 m di profondità.

Possiamo perciò affermare che siamo di fronte ad una specie con un'ampia distribuzione geografica indopacifica.

Non ci risultano ritrovamenti per il Mar Rosso e quindi con i

dati in nostro possesso *Jaminea cylindrica* non può ancora essere considerata come specie prettamente lessepsiana (OLIVERIO, 1995), anche se riteniamo possa probabilmente appartenere a questa categoria.

Dimensioni

L'altezza degli esemplari varia tra mm 1,3 e mm 1,6 non discostandosi dalle misure riportate da de Folin (mm 1,4). Le maggiori dimensioni riscontrate sono le seguenti: 1,66 x 0,50 (Figg. 1, 2). La bocca misura mediamente 0,6 mm e rappresenta circa il 36% dell'altezza della conchiglia.

DISCUSSIONE

Il genere *Jaminea* de Folin, 1870 (in DE FOLIN & PÉRIER) è un errore tipografico pro *Jaminia* Brown, 1827 non Risso, 1826 (SCHANDER *et al.*, 1999), la cui specie tipo è *Turbo interstinctus* Montagu, 1803 che viene posta tra i sinonimi juniores di *Chrysallida obtusa* (Brown, 1827) da SABELLI *et al.* (1990).

Il genere *Chrysallida* Carpenter, 1856, ancora lontano dall'essere ben inquadrato, si presta a differenti interpretazioni a secondo degli Autori (PEÑAS *et al.*, 1996).

In ogni caso *Chrysallida s. l.* come inteso da diversi Autori moderni europei (AARTSEN, 1977; LINDEN & EIKENBOOM, 1992; PEÑAS *et al.*, 1996; PEÑAS & ROLÁN, 1998) ha scultura assiale considerevole, striatura spirale più o meno marcata, dente columellare e protoconca del tipo B o C.

Evidentemente la specie trattata non può essere ricondotta a *Chrysallida,* non presentando scultura assiale.

DE FOLIN (1872) descrisse *Jaminea bilirata* che è stata recentemente oggetto di studio da parte di PEÑAS & ROLÁN (1999) che l'hanno collocata nel genere *Pseudoscilla* Boettger, 1901, genere caratterizzato dalla presenza di forti cordoni spirali distanziati da un intervallo molto ampio con microscultura assiale, mancanza di dente columellare e protoconca di tipo B tendente a C.

Neanche questo genere sembrerebbe adatto così come *Cingulina* A. Adams, 1860 che comprende conchiglie con forti cordoni spirali regolari distribuiti in molti giri spirali, prive di dente columellare e protoconca del tipo A.

OLIVER (1915) istituisce il genere *Hinemoa*, di cui riportiamo la descrizione originale: "*Shell ovate. Protoconch 1-whorled. Aperture ovate. Columella with a fleeble plait. Sculpture of spiral ribs only*". Specie tipo: *H. punicea* (OLIVER, 1915: 531, pl. X fig. 22).

A questa descrizione possiamo aggiungere che l'olotipo è una conchiglia minuta, di mm 1,1 di altezza, che presenta solo 4 giri spirali ed è di colore rossastro.

H. punicea ha in comune con *J. cylindrica* gli anfratti obliqui, il numero di giri spirali (3 nella teleoconca), la presenza di soli cordoncini spirali ben rilevati ed arrotondati, gli intervalli privi di striatura, l'apertura ovale, il labbro esterno sottile, un flebile dente columellare, la superficie liscia e presumibilmente dalla descrizione originale la forma della protoconca del tipo C.

LASERON (1959) osserva: "*Hinemoa can therefore be taken as quite separate from the true Oscilla and its covers what seems a natural group of south-western species*".

Tra l'altro talune specie illustrate da LASERON (1959: 259, figg. 70, 73) attribuite al genere *Hinemoa* presentano una notevole rassomiglianza con *H. cylindrica.*
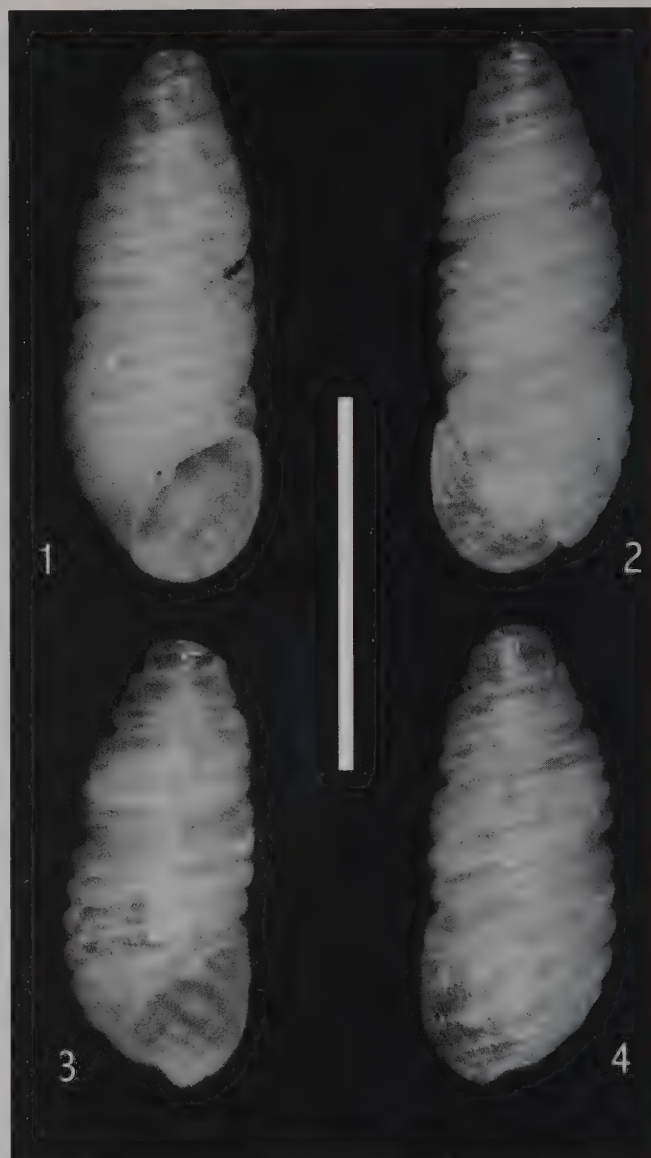
Figure 1, 2. *Hinemoa cylindrica* (de Folin, 1879). Tasuchu (Turchia sudorientale), Scala, 1 mm.

Il genere più vicino ad *Hinemoa* è *Oscilla* A. Adams, 1861, con specie tipo *Monotygma cingulata* A. Adams, 1861, che è caratterizzato da conchiglie di forma allungata con cordoncini spirali pronunciati, obliqui ed equidistanti, dente columellare evidente, apertura subquadrata e labbro internamente lirato e protoconca del tipo B.

THIELE (1929) e WENZ (1940) considerano *Oscilla* quale genere caratterizzato da conchiglie con cordoni spirali di spessore uniforme mentre in *Hinemoa* si presentano disuniformi.

Siamo propensi a seguire il pensiero dei suddetti Autori aggiungendo che la differenza tra i due generi è soprattutto legata alla forma della conchiglia, allungata e con maggior numero di giri spirali in *Oscilla*, ovale in *Hinemoa*, alla conformazione e all'andamento dei cordoncini spirali, uniformi, generalmente in numero di tre per giro in *Oscilla* e disuniformi in *Hinemoa*, agli intervalli striati in *Oscilla* e lisci in *Hinemoa*, alla struttura del dente columellare più rilevante in *Oscilla* e flebile in *Hinemoa*, ed infine alle dimensioni sempre più minuscole in *Hinemoa*.

Non siamo certi se queste differenze siano tali da giustificare una diversificazione a livello specifico o se *Hinemoa* vada meglio interpretata come sottogenere di *Oscilla* ma essendo l'aspetto morfologico della conchiglia nei Pyramidellidae ancora basilare per stabilire l'esatta appartenenza ad un determinato gruppo solo la presenza di studi anatomici appropriati può dissolvere dubbi ed incertezze.

Sebbene *J. cylindrica* non rispecchi a pieno tutte le caratteristiche del genere *Hinemoa* diffenziandosi soprattutto nella forma che non è ovale e nel numero dei cordoncini spirali che tendono ad aumentare col crescere della conchiglia (2 nel terzo giro e 3 nel quarto) e nel colore uniformemente bianco, pensiamo possa quantomeno rappresentare il genere più vicino a noi attualmente conosciuto.

Altri generi si avvicinano ad *Hinemoa* come *Miralda* A. Adams, 1864, così come comunemente inteso, che presenta una scultura notevole di cordoncini spirali predominante su quella assiale che è appena accennata nella parte superiore della spira e protoconca del tipo A e ben illustrata da HOENSELAAR & MOOLENBEEK (1990: 65, figg. 1-4) e ROLÁN & FERNANDES (1993: 6, pl. 11 figg. 1-3) sebbene la specie tipo *Parthenia diadema* A. Adams, 1860 sia piuttosto problematica (AARTSEN *et al.*, 1998: 11); così come *Monotygma* J. E. Gray, 1847, a cui appartengono conchiglie con costole debolmente sviluppate, una scultura composta da fini cordoncini spirali e protoconca del tipo A o B. Entrambi i generi si differenziano nettamente da *H. cylindrica* presentando costoline assiali.

Il genere *Odetta* de Folin, 1870 con specie tipo *Ondina sulcata* de Folin, 1870 è caratterizzato da pronunciate strie spirali con intervalli lisci tra esse, piccolo ma evidente dente sulla columella, fessura ombelicale e protoconca del tipo A (AARTSEN, 1984). Vedi il lectotipo raffigurato in AARTSEN *et al.* (1998: 15, fig. 10).

La maggior consistenza e la forma dei cordoncini spirali con intervalli leggermente più ampi, la mancanza di ombelico e dente columellare meno pronunciato in *Hinemoa* ci inducono a tralasciare l'appartenenza a questo genere.

Infine aggiungiamo che non si è potuto confrontare il materiale in nostro possesso con l'olotipo di *J. cylindrica* in quanto non presente nella collezione de Folin custodita nel MNHN (KISCH, 1959; V. Heros, *comun. pers.*) e neppure presso il BMNH (K. Way, *comun. pers.*) e quindi presumibilmente può essere considerato perduto.

Hinemoa cylindrica (de Folin, 1879) va perciò a sommarsi ad altre numerose specie aliene di Pyramidellidae conosciute per il Mar Mediterraneo.

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The genus *Granulina* (Marginellidae) in the Canary Islands

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KEY WORDS: Marginellidae, *Granulina*, Lusitanian Province, Canary Islands, new species.

ABSTRACT The species of the genus *Granulina* (Gastropoda: Marginellidae) from the Canary Islands are revised, and discussed in the context of the apparent assymetrical diversity displayed on each side of the Strait of Gibraltar.
The animal of *Granulina guancha* (d'Orbigny,1840) is described, and informations are given on the habitat and the distribution of the species. A new species (*Granulina canariensis* n.sp.) is described from the mid shelf.

RIASSUNTO Sono esaminate le specie del genere *Granulina* (Gastropoda: Marginellidae) dalle Isole Canarie (Spagna). Si discute anche l'apparente asimmetria faunistica ai due lati dello Stretto di Gibilterra. Si suggerisce che il maggior numero di specie noto per il Mediterraneo sia il risultato di maggiori e più approfonditi studi in quest'area.
Si descrive l'animale di *Granulina guancha* (d'Orbigny,1840) e vengono fornite informazioni su habitat e distribuzione nota della specie. Una nuova specie, *Granulina canariensis* n.sp., è descritta dalla zona circalittorale.

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INTRODUCTION

In his revision of the genus *Granulina* in the Mediterranean and the Eastern Atlantic, GOFAS (1992) gave only two species occuring in the Ibero-Moroccan Gulf [*Granulina occulta* (Monterosato, 1869) and *Granulina minusculina* (Locard, 1897)] and one species occuring in the Canarian Archipelago [*Granulina guancha* (d'Orbigny, 1840)].

Granulina occulta is said to be a mid to deep shelf species, which extends also to the whole of the Mediterranean, and *Granulina minusculina* is said to be a bathyal species, living down to 1.300 m and extending also to the Western Mediterranean. *Granulina guancha* was presented by Gofas without comment about living populations and bathymetric distribution.

Gofas did not quote any other known populations of *Granulina* for all the northwest African coasts from Western Morocco to Western Sahara, and just recorded shallow and deep species from Mauritania and further south. No further species of *Granulina* is recorded in the literature, as far as the Atlantic side of the Lusitanian Province is concerned.

On the other hand, Gofas scored four species ranging along the inner Mediterranean Sea and two species restricted to the Strait of Gibraltar. More recently, four new species were described from Central Mediterranean and Alboran Sea (SMRIGLIO & MARIOTTINI, 1996 and 1999; SMRIGLIO, MARIOTTINI & RUFINI, 1998; LA PERNA, 1999) and reported from circalittoral and bathyal levels.

Even if these last four species are waiting for a revision including the study of intraspecific variability, the genus *Granulina* can be appreciated as very well-represented in Mediterranean, compared to the apparent poor incidence reported from the adjacent Atlantic. However, this impression could derive from very unequivalent efforts of observation and sampling, as the recent discoveries in Mediterranean are coming from areas especially well-sampled and studied over the last twenty years (Central Mediterranean and the Strait), while the Atlantic side of the Lusitanian Province has been much less sampled during the same period.

Taking into account the wide considered area, from Cape St Vincent (South Portugal) to Cape Blanco (Western Sahara), the record of a so-called restricted number of species from the northwest African shelf can be considered as unseemly, compared to the relatively large number of species of *Granulina* recorded from the adjacent Mediterranean. The comparison of the respective real diversity of *Granulina* in both areas is relevant from a biogeographical point of view. It is to be verified whether there is a spatial continuity of the specific diversity in this genus all along the Lusitanian Province, or if a special increase (or maintenance) of the diversity in Mediterranean occured whilst the diversity was maintained (or reduced) in Northwestern Africa, for example through severe environmental events such as during the last glaciations.

This paper is devoted to a study of the genus *Granulina* in Canary Islands, and conceived as a contribution to the necessary reevaluation of the specific diversity of *Granulina* along the Lusitanian Province.

MATERIAL AND METHODS

Abbreviations Used

IRSNB: Institut Royal des Sciences Naturelles de Belgique, Brussels.

MNHN: Muséum National d'Histoire Naturelle, Paris.

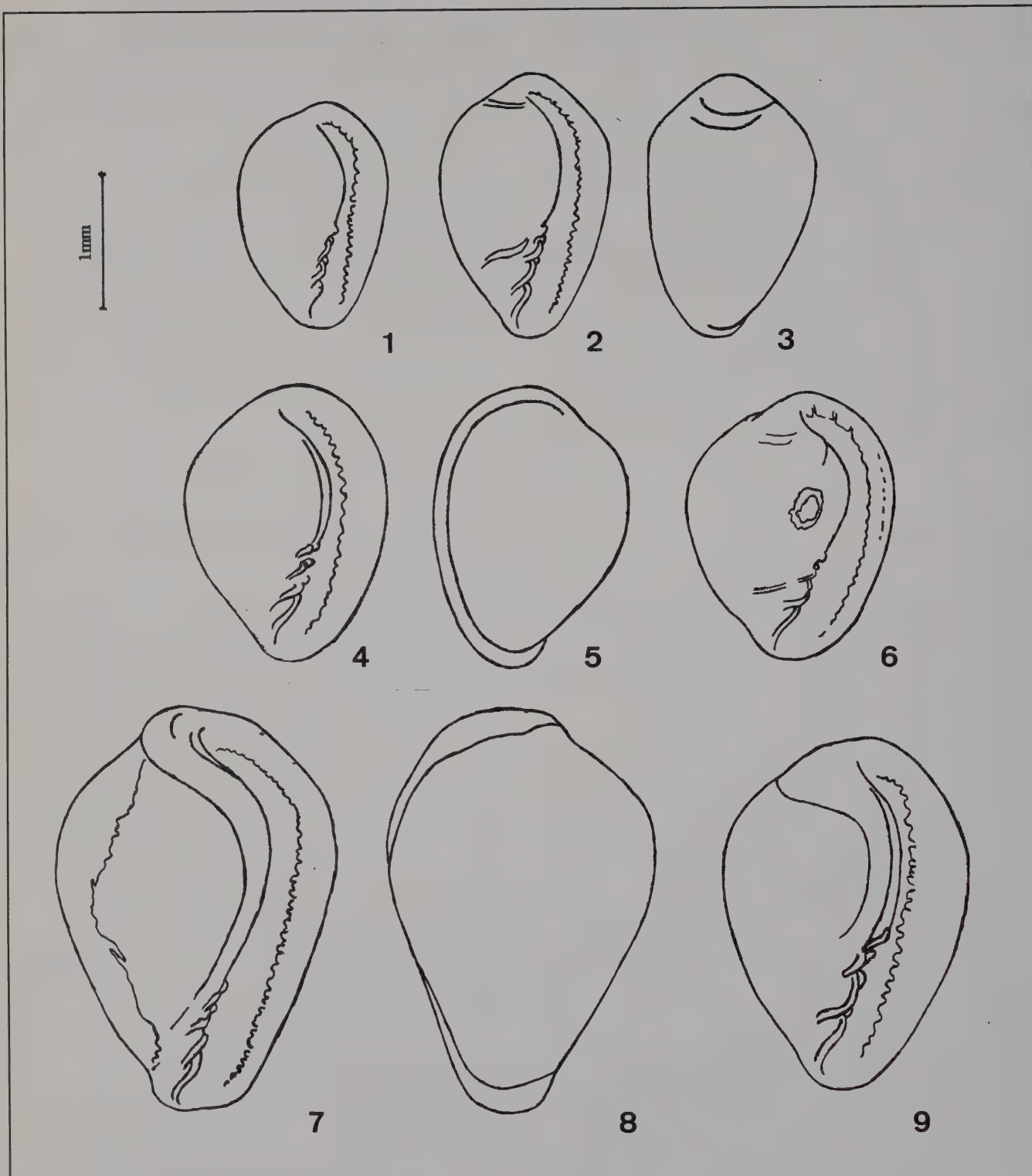
NNM: Nationaal Natuurhistorisch Museum, Leiden, the Netherlands.

CFB: Collection Franck BOYER, Sevran, France.

CFG: Collection Franco GUBBIOLI, Marbella, Spain.

CFSG: Collection Francisco SICILIA GUILLEN, Arrecife, Lanzarote, Spain.

CFS: Collection Frank SWINNEN, Lommel, Belgium.

CWE: Collection Winfrid ENGL, Dusseldorf, Germany.

Figs. 1-9: Eastern Atlantic *Granulina*. 1: *Granulina guancha* (d'Orbigny). Lectotype (1.6 x 1.1 mm). Tenerife, in sands on the coast. BMNH. 2-3: *Granulina guancha* (d'Orbigny). Specimen (1.9 x 1.2 mm) from Lanzarote, Arrecife, El Reducto, 2 - 3 m. CFB. 4-5: *Granulina minusculina* (Locard). Lectotype (2.0 x 1.5 mm). West Morocco, 112 m. MNHN. 6: *"Marginella aliciae"*, manuscript name from Bavay. Cotype (1.95 X 1.65 mm). Off Portugal, Station Princesse Alice n° 2717/19.VII.08/750 m. Coll. Dautzenberg, IRSNB. 7-8: *Granulina canariensis* n. sp. Holotype (3.0 x 2.0 mm). Fuertaventura, off Puerto del Rosario, 100 m. MNHN. 9: *Granulina africana* Gofas. Holotype (2.6 x 1.8 mm). Senegal, off Gorée, 50 m. MNHN. Scale bar: 1 mm.

Sources of material

The author have studied material of *Granulina* in 3 public collections (Dautzenberg Collection in IRSNB, General Collection in MNHN, CANCAP Collection in NNM) and in 5 private collections (CFB, CFG, CFSG, CFS, CWE), in which Lusitanian and Macaronesian recolts are especially well-represented.

The most representative material of micro-molluscs from Canary Islands was observed in CANCAP Collection (NNM) with dead shells from dredgings (principally 60 to 240 m), in Collection W. Engl with dead shells sieved by diving (principally 20 to 40 m) and in the collection of the author with live specimens sieved by snorkeling (low tide level to 6 m).

RESULTS

Provisionally, we follow the position of LA PERNA (1999: 33), based on the external anatomy of the animals, and refer the genus *Granulina* to the family Marginellidae Fleming, 1828, rather than to the family Cystiscidae Coovert and Coovert, 1995.

Genus *Granulina* Jousseaume, 1888.

Type species by monotypy: *Marginella pygmaea* Issel, 1869, non Sowerby, 1846 (= *Marginella isseli* G. & H. Nevill, 1875). Red Sea.

***Granulina guancha* (d'Orbigny, 1840)**
(Figs. 1-3)

Original reference: *Marginella guancha* D'ORBIGNY, 1840: 88, p6, figs. 32 - 34.

Type material: Lectotype designated and figured by GOFAS, 1992 (fig.1). BMNH 54.9.28.109.

Material examined - In CFB: Hierro, shallow water: 9 specimens. Hierro, La Restinga, 30 - 35 m, 04 - 99: 12 specimens (ex-CWE). Gran Canaria, Arinaga, 1 m, 11 - 98: 1 specimen. Lanzarote, Arrecife, El Reducto, 2 - 3 m, 06 - 99: 10 specimens (figs. 2-3). Lanzarote, Puerto del Carmen, 46 - 50 m, 03 - 97: 10 specimens (ex-CWE, Figs. 11, 12). Lanzarote, off Playa Blanca, 40 to 100 m: numerous shells. Fuertaventura, off Isla de Lobos, 60 to 100 m: 1 adult and 1 subadult shells.

In CWE: several lots of shells from infralittoral, sieved off Hierro and Lanzarote.

In Collection CANCAP (NNM): several lots of shells from circalittoral levels, dredged off Lanzarote and Fuertaventura.

Type locality: Tenerife, in coastal sands.

Description - GOFAS (1992:20) redescribed the shell accurately. Its principal distinctive characters are a somewhat slender outline, slightly rostrated posteriorly, with a slight break of the last whorl at the anterior quarter. Faint labial denticles. Outline of the labrum bevelled at the posterior third part. The general look is somewhat angular, due to several sharp breaks of the outline. A very fine microsculpture of intricated low granulations is apparent under high magnification (over x 80), additionally to very narrow growth lines.

The animal was observed by the author in Lanzarote (Arrecife, El Reducto, 2-3 m), through 10 live specimens sieved in short algal material on a rocky ground.

The foot is hyalinous-translucent with whitish to yellowish-cream cloudy blotches, more grouped on the mentum and more scattered on the lateral sides of the foot, except on the posterior third part which just bears a whitish to creamy yellow- orange axial band, widening towards the posterior tip. The center of the sole is decorated of very fine black flecks.

The head and tentacles are hyalinous-translucent, the siphon is creamy to creamy-orange, sometimes darker towards the tip.

The internal mantle is light cream with orange dots, more or less large, dark and scattered. The external mantle is light creamy yellow-orange with few scattered orange dots around the superior part and with low to produced whitish pustules. In fact, the relief is made of a continuous superficial coat of hyalinous skin, of which the irregular bumps and digitations are just surimposed to whitish dots of the mantle. In these conditions, bumps play like lens over whistish dots and seem themselves to be of a whitish colour for the observer looking in a perpendicular view.

Around the edge of the mantle three zones of dense blackish flecks and medium to dark orange blotches and dots are arranged. Two of these blackish zones are bordering each of the lateral-anterior side of the edge. The third blackish zone is situated along the central posterior part of the edge, and shows a narrowed part towards the apical tip. These three zones may just look like straight bordering fringes along the edge in some specimens, but they also may be much wider and lay till the lateral half-side of the mantle when this one is completely recovering the shell.

No orange point or dot on the foot, head and siphon on the 10 live specimens examined from Arrecife, nor any blueish dot on the external mantle were observed.

As a matter of fact, the chromatism of the soft parts of *Granulina guancha* presents a pattern clearly distinct from that of all Mediterranean species, as figured in Gofas (1992, pl. I).

Habitat - Only observed in Gran Canaria and Lanzarote from short algal growth on rocks and boulders in shallow water, in protected places. However the species is known to be also found from deeper levels, to around 100 m, and seems to prefer short vegetation growing on detritic rough sediments, as deducted from dredged samplings.

Distribution - NORDSIECK & TALAVERA (1975: 155) quoted the species from Tenerife, Gomera, Lanzarote, Salvajes and Madeira. According to the present records, it is proposed to add Hierro, Gran Canaria and Fuertaventura to the distribution of *Granulina guancha*, which seems in fact to spread all along the Canarian Archipelago.

GOFAS (1992) noted that the occurrence of the species in Madeira and Islas Desertas has to be verified, as the shells coming from these places seem to be slightly more slender.

However, narrow and slender shells of *G. guancha* were also collected at circalittoral levels off southwest Lanzarote (CFB).

The occurrence of populations of *Granulina guancha* in shallow water (0-3 m) was observed to be very scarce in Gran Canaria as well as in Fuertaventura, and the research was only fruitful in very restricted areas of very protected places.

Remarks - The supposed level of frequency and abundance is commented in a very contradictory manner by D'ORBIGNY (1840: 88) and NORDSIECK & TALAVERA (1979: 155). In fact, these authors considered only shells sorted out from coastal sands. In such conditions the evaluation of frequency and abundance cannot be considered as reliable.

According to the studied material and labels, and to field observations of the author, it seems that the species avoids shallow water, except in accidental conditions, and prefers to live at deeper levels. The matter is however to be verified through extensive samplings on hard bottoms in shallow waters.

It is here stressed the fact that the *Granulina* species present very often a scattered pattern of settlement in shallow water, and that shallow populations can be locally abundant in a small protected area just for the duration of one season, then disappearing for several years. Other micromolluscs sharing the same habitat are able to remain present for longer periods (personal observations in Lesser Antilles, in Western Mediterranean and in Mascarene Islands).

Observed occurrences of *Granulina guancha* in shallow waters of the Canary Islands seem to confirm this pattern of very fragile populations and erratic settlement, as far as the shallow levels are concerned. This pattern would be coherent with a marginal status of the populations reaching the coastal levels. However, such a pattern remains to be fully described and explained.

Granulina canariensis n.sp
(Figs. 7-8, 10)

Etymology: from the geographical distribution of the species, throughout the Canary Islands.

Type material - Holotype (3 x 2 mm) deposited in the Paris Museum (MNHN) (figs.7-8), and 14 paratypes (L = 2.9 to 3.1 mm): trawled off Puerto del Rosario, Eastern Fuertaventura, 100m. All adult shells.

16 paratypes dredged off Isla de Lobos, North Fuertaventura, 60-100 m:13 adult shells (L = 2.8 to 3.15 mm), 1 subadult and 2 juveniles.

11 paratypes trawled off Peninsula de Jandia, South Fuertaventura, 100-125 m: 6 adult shells (L=2.9 to 3 mm) and 5 juveniles.

All paratypes in CFB.

Other material examined - Three drilled shells (1 adult and 2 subadults) in CWE, trawled in 1997 off Agaete, North -West Gran Canaria (28° 07' 03" N, 15° 50' 20" W), 180-240 m. 5 adult shells (1 intact, 3 drilled and 1 badly crabbed), in CFB (ex-CWE) trawled off SW of Fuertaventura (28° 09' 03" N - 14° 25' 20" W), 107 m, 10-97 (fig. 10). Several lots of shells from circalittoral levels in Collection CANCAP (NNM), dredged off Fuertaventura.

Type locality: Fuertaventura, Canary Islands.

Description - Shell very large sized for the genus, average length 2.9 mm, average width 1.9 mm. Pyriform and slightly slender outline.

The posterior rostrum is somewhat truncated and the anterior part is tapering, with a sharp break of the last whorl just before the base on the left side. Outline of the labrum is deeply arched in the upper part and nearly straight in the two anterior thirds, which bear more distinct small inner denticles (average number: 42).

Four columellar pleats, the two anterior ones larger and more oblique, well separated from the two posterior small ones that are shorter, clearly duplicated and more perpendicular to the columella.

A thick columellar callus covers the columella. This callus is more developed towards the posterior part and wraps the top of the shell, as a continuation of the labial margin.

A fine microsculpture of intricate low granulation, very similar to *Granulina guancha*, is apparent under high magnification.

The animal is unknown.

Habitat - Unknown, but a good proportion of fresh dead shells were found in fine sediments collected off Fuertaventura, suggesting that the species lives on soft bottom environments.

Distribution - Known from Fuertaventura and Gran Canaria from around 60-100 m to 180 - 240 m. Fuertaventura and Gran Canaria. Not recorded from Madeira, nor from the West African continental shelf.

Remarks - The available records from northern parts of Fuertaventura and Gran Canaria lead to infer that the species very probably occurs also in Lanzarote and Tenerife, and possibly in the western islands of the archipelago. The most directly comparable species for shell size is *Granulina africana* Gofas, 1992 (Fig. 9), which differs by the smaller (average length = 2.2 to 2.8 mm), thicker and more rounded shell, the less numerous but strong labial denticles (average number: 30), and the more spaced and larger first and second columellar pleats. *Granulina africana* is known from Senegal to Ivory Coast, at 32 to 150 m, whereas *Granulina canariensis* n.sp. is just known by now from Canary Islands, at similar depths.

In fact, these two species do not seem to be close phyletic relatives, and *Granulina canariensis* n.sp. appears to have a very distinctive shell morphology, with no equivalent in Atlantic waters. However, both species could occupy in their respective range of distribution the same environmental place, as both seem to live on soft bottom plains at circalittoral levels.

DISCUSSION AND BIOGEOGRAPHIC REMARKS

Inquiries led to establish the existence of two well-spread species in the Canary Islands, *Granulina guancha* d'Orbigny from 0 to 100 m and *Granulina canariensis* n.sp. from 60 - 100 m to 180 - 240 m. Both species may apparently live at the same level around 60 - 100 m , but they do not necessarely share the same habitat. The occurrence of these two species on the continental shelf of Southern Morocco and Western Sahara is not attested.

The identity of the shells recorded from Mauritania by Talavera (1975) as *Granulina guancha* remains to be verified, as more recent samplings off Mauritania in shallow (Gofas, 1992; Rolán & Fernandes, 1997) and deep waters (Coll. CANCAP III, 1978, NNM; CFG) did not confirm really the matter. The real identity of *Granulina cf. guancha* from Madeira remains to verify.

Taking in account the extensive material examined from Canary Islands, it is assumed that *Granulina guancha* and *Granulina canariensis* are the most abundant and widespread species ranging on mid and lower shelf of the Archipelgo. A future discovery of further species in Canarian waters from these levels remains possible, as some species of *Granulina* can have very sparse populations and limited number of individuals (personal observations of the author). For instance, a few number of shells showing a slender-ovoid outline and rather referable to *G. occulta* (figs. 11-12) are found at circalittoral levels off southwest Lanzarote, collected with other shells more or less intergrading with *G. guancha* (break of the outer lip profile and thickened central Labrum). The bathyal benthic microfauna of Canary Islands remains very poorly known, and the occurrence of species of *Granulina* at these depths is very probable.

Along the Ibero-Moroccan Gulf, the bathyal levels are said to be inhabited by *Granulina minusculina* (Locard, 1897), known to be living from 112 to 1285 m on muddy bottoms, and presenting a very different medium sized shell (length from 2 to 2.2 mm) with a very regularly rounded last whorl and a highly elevated top of the labrum (Figs. 4-5). The type locality of *Granulina minusculina* is "West of Morroco, 112 m" (Travailleur 1882, St. 34), but the southern limit of its distribution is unknown. The species is said to extend also to most of the western basin of Mediterranean, where several geographic variants (subspecies ?) could occur.

Several species described in the last times from Mediterranean seem to be very close with *Granulina minusculina*, and have been separated after subtle characters:

. *Granulina gofasi* Smriglio and Mariottini, 1996 - 300-600 m, Central Tyrrhenian.

. *Granulina melitensis* Smriglio, Mariottini and Rufini, 1998 - 70-250 m, Central Tyrrhenian, South Western Siciliy and Malta.

. *Granulina gubbiolii* Smriglio and Mariottini, 1999 - 300-350 m, North Western Alboran Sea.

The *Granulina minusculina* complex certainly deserves an accurate study as a phyletic group, including the chromastism of the soft parts, morphometric comparison of the shells and elements about distribution and sympatry.

While studying the Collection of Dautzenberg in IRSNB, the author discovered a lot of two shells of *Granulina cf. minusculina*, labelled as "*Marginella aliciae* Bavay. Au large du Portugal. Cotypes. Dautzbg" and "*Marginella* Pr Alice. Stn. 2717/19.VII.08/750 m au large du Portugal". One adult (Fig. 6: 1.95 x1.65 mm) and one subadult (2 x 1.45 mm) shells. Actually, Bavay never published this name, probably because he later discovered that the species was already described and named by Locard (1897). Even the adult specimen shows a less thickened labrum and a wider aperture than the lectotype of *Granulina minusculina* (Figs. 4-5, West of Morocco, 112 m). In fact, both specimens are closer with the type material of *Granulina gubbiolii* from Alboran Sea better than with the type material of *Granulina minusculina*, as pictured in Gofas (1992) and in Smriglio & Mariottini (1999). In the present state, it is not possible to say whether *Granulina minusculina* and *Granulina gubbiolii* are both represented in Ibero-Moroccan Gulf as two sibling species, or if they just represent geographic variants of the same species.

The same kind of situation seems to occur with the taxon *Granulina occulta* (Monterosato, 1869): several related forms are represented in Mediterranean and in Ibero-Moroccan Gulf. The species *Granulina guttula* La Perna, 1999 was recently described from such a population (84 m, Eastern Tyrrhenian).

In fact, the lacking of reliable samplings and records along the Atlantic coast and shelf of Morocco seems to be the principal origin of an under-estimation of the real diversity of marine micro-molluscs in this area.

For example, the author found three different morphae of *Granulina* within a limited amount of sediment collected in beach drift along a small protected creek 10 kms NorthWest of Agadir (BouZellou quarry), West Morroco:

- 1 shell of *Granulina occulta* (slender Mediterranean form, large size).
- 2 shells of *Granulina torosa* Gofas, 1992, only known till now from Strait of Gibraltar.
- several smaller shells which could be dwarf specimens of *Granulina torosa* or an undetermined species.

Granulina occulta and *Granulina torosa* were only known from somewhat deep sublittoral levels. Depending on the conditions of their discovery in the vicinity of Agadir, these species probably inhabit a somewhat shallow level here (5-10 m ?).

As a matter of fact, 3 morphotypes of *Granulina* can be considered as new for Atlantic area of the Lusitanian Province, and provisionally attributed to the next taxa:

. *Granulina canariensis* n.sp. from Canary Islands, circalittoral,

. *Granulina gubbiolii* Smriglio and Mariottini (as *M. aliciae* Bavay, ms name) from Portugal, bathyal,

. *Granulina torosa* Gofas from Agadir, littoral.

These simple records greatly increase the number of morphotypes of *Granulina* known from the Atlantic part of the Lusitanian Province, and suggest that the specific diversity of *Granulina* occuring in this area is not necessarely lower than the diversity displayed in Mediterranean.

Deeper investigations are required along the whole sections of coasts and shelfs of Lusitanian Province, and about the natu-

Figs. 10-12. 10: *Granulina canariensis* n. sp. SW Fuertaventura, 107 m depth, CWE. 11-12: *Granulina* cfr *occulta* (Monterosato). Lanzarote, off Playa Blanca, 40-100 m depth, CFB. Scale bars: 1 mm (10), 500 µm (11-12).

ral variability of each population encountered (shell morphology and chromatism of the soft parts). On this basis, a more accurate knowledge of the actual diversity of the Lusitanian *Granulina* will be gained, and their respective biogeography and distribution could be tentatively interpreted.

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Nueva información sobre *Macromphalus tyroi* (Gastropoda, Vanikoridae)

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KEY WORDS: *Macromphalus*, Vanikoridae, West Africa.

ABSTRACT New information on *Macromphalus tyroi* HOENSELAAR & MOOLENBEEK, 1994 is provided, presenting photographs at SEM of the adult shell, protoconch, operculum and radula. Some corrections on the information from the original description are reported.

RESUMEN Se muestra nueva información sobre *Macromphalus tyroi* HOENSELAAR Y MOOLENBEEK, 1994, presentando fotografía al MEB de la concha adulta, protoconcha, opérculo y rádula. Se hacen algunas correcciones a la información de la descripción original.

RIASSUNTO Sono riportate nuovi dati su *Macromphalus tyroi* HOENSELAAR Y MOOLENBEEK, 1994. Si illustrano per la prima volta al SEM protoconca, telecoconca, opercolo e radula. Sono inoltre riportate alcune correzioni alla descrizione originale.

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INTRODUCCIÓN

HOENSELAAR & MOOLEBEEK (1994), describen *Macromphalus tyroi* de Banc d'Arguin, Mauritania, en base a unas 15 conchas recogidas en diversas recolecciones. En el trabajo de descripción original se muestra dibujo del holotipo y de la protoconcha y, aunque se menciona "*microsculpture of minute tubercles*", estos no aparecen en el dibujo, cuya finalidad es más bien la de comparar esta protoconcha con la de *Macromphalus reticulatus* (Wood, 1842). La altura del holotipo es de 2,55 mm, aunque se comenta que la concha más grande estudiada tenía 3,6 mm. El borde labial del holotipo está roto. Por otra parte, en esta descripción original no se aportaban fotografías al SEM de la concha, protoconcha, ni información sobre opérculo y radula.

La especie había sido representada previamente por WARÉN & BOUCHET (1988, fig. 29, como *Macromphalus* sp) de Dakar, Senegal, presentando una concha en mal estado y algo juvenil, con 2,9 mm de altura.

MATERIAL

El material estudiado fue obtenido en sedimentos recolectados por los autores y procede de Banc d'Arguin, de sedimentos explayados, y de dragados realizados en Nouadhibou, a 2-3 m de profundidad.

RESULTADOS Y COMENTARIOS

El hallazgo de varias conchas adultas de esta especie, algunas con las partes blandas en su interior, nos ha permitido aportar algunos datos complementarios sobre la misma y hacer algunas correcciones a la descripción original.

Mostramos fotografía de una concha (Fig. 2) de 2,4 mm, similar en tamaño al holotipo de la especie, y que muestra sus mismas características. Indudablemente se trata de una concha juvenil, ya que los adultos (Fig. 1) pueden alcanzar un tamaño de 4,2 mm.

En la descripción original se menciona "*dominant opisthocline axial ribs*" pero, realmente, puede observarse (Figs. 1, 2) que estas costillas axiales son ligeramente prosoclinas y no opistoclinas.

Las costillas axiales no son la escultura predominante en las conchas adultas, ya que casi desaparecen en la última vuelta, convirtiéndose en simples nódulos, que se aprecian sobre los cordones espirales, siendo estos últimos los que constituyen realmente la escultura predominante.

La protoconcha (Fig. 4) es bulbosa, de poco más de una vuelta de espira; está totalmente cubierta por microtubérculos bastante regularmente distribuidos, aunque alineados espiralmente en muchas zonas. En conchas adultas, estos tubérculos pueden no observarse en la parte superior del ápice por estar notablemente erosionados.

La rádula (Fig. 5) es de tipo taenioglosо. El diente central tiene un soporte basal trapezoidal muy ancho; en su cúspide hay un dentículo central grande y puntiagudo, y 3 algo más cortos a cada lado. Los dientes laterales tienen una base mucho más amplia que el central, su cúspide está formada por un grueso y puntiagudo dentículo, hay 4 dentículos más finos en su borde interno y unos 6 en su borde externo. Los dientes marginales son largos y estrechos; la cúspide del diente marginal interno está finamente aserrada, observandose 18-20 dentículos en su margen externo. El diente marginal externo tiene forma de gancho, su cúspide está denticulada en su margen interno y los dentículos, apenas perceptibles, son romos y poco prominentes.

El opérculo (Fig. 6) es córneo, amarillento, algo transparente, fino, ovoide casi semicircular, paucispiral y con el núcleo excéntrico.

Eu área de distribución conocida se extiende desde la Bahía de l'Etoile hasta Dakar.

En la descripción original se compara la nueva especie con *M. reticulatus* (Wood, 1842) y con *M. abylensis* Warén y Bouchet, 1988. También debería ser comparada con *M. saharicus* Rubio y Rolán, 1993, morfológicamente bastante similar; pero algo más globosa y con menos escultura axial.

En cualquier caso, *M. tyroi* es una especie bien definida, que se diferencia de *M. abylensis* y de *M. saharicus* por su escultura reticulada y por los tubérculos de su protoconcha, que son más finos que los que aparecen en *M. saharicus* y cubren toda la protoconcha, a diferencia de lo que ocurre en *M. abylensis*. La radula de *M. tyroi* es muy semejante a las de las especies de *Macromphalina* de la costa occidental de Africa y de algunas especies del género *Talassia*. De las restantes especies de *Macromphalus* de Africa occidental se diferencia radularmente, porque los dentículos de sus cúspides son menos numerosos.

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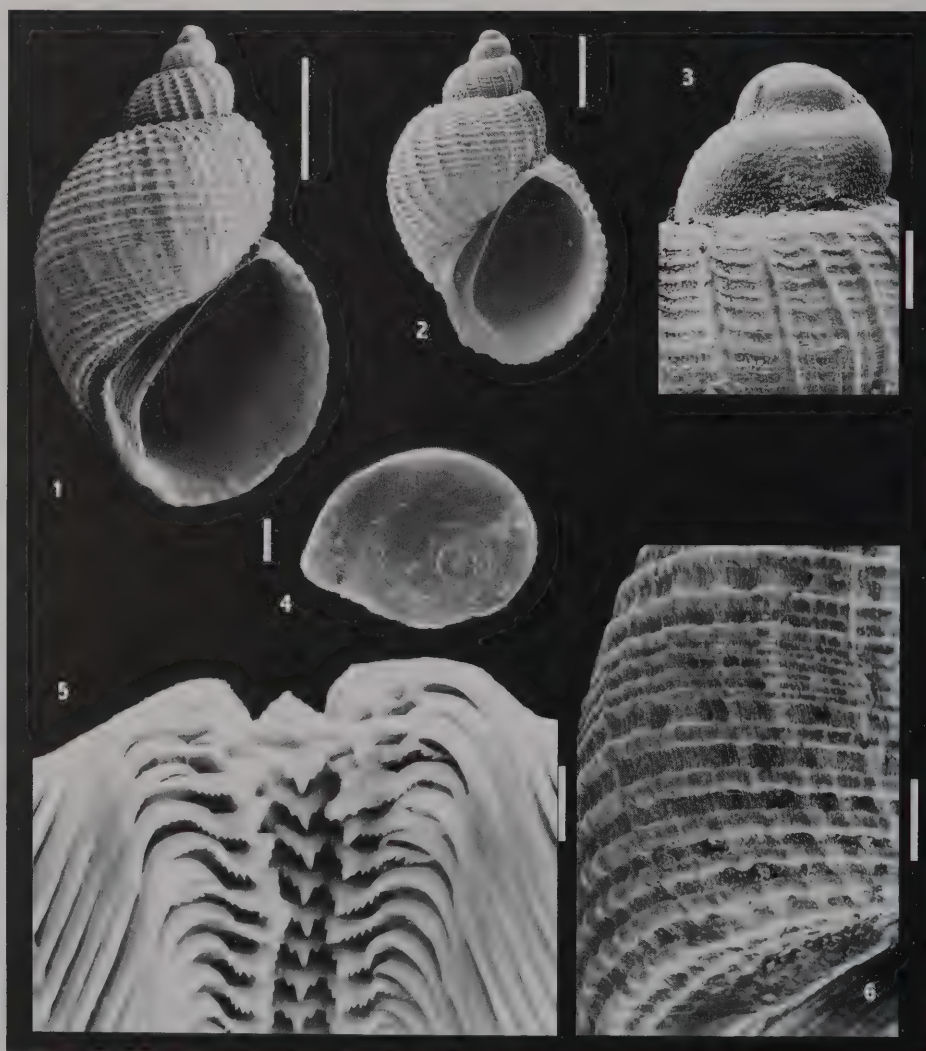
Figuras 1-6. *Macromphalus tyroi,* Banc d'Arguin, Mauritania. 1. Concha adulta. 2. Concha juvenil. 3. Protoconcha. 4. Opérculo. 5. Rádula. 6. Escultura de la última vuelta de un ejemplar adulto. Escalas: 1 mm (1), 500 µm (2), 200 µm (3, 6), 100 µm (4), 10 µm (5).

Le lettere di Fortunato Luigi Naccari a Luigi Ramello in tema di raccolte naturalistiche (1820; 1830-31)

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KEY WORDS: Adriatico, Naccari, collezionismo naturalistico, XIX secolo, Chioggia, conchiglie.

ABSTRACT *Fortunato Luigi Naccari's letters to Luigi Ramello on the subject of natural history collections (1820; 1830-31)* We reproduce here some excerpts from letters sent by the Chioggia naturalist Fortunato Luigi Naccari (1793-1860) to the Canon Luigi Ramello (1782-1854) in the years 1820 and 1830-31. A large part of these letters deals with a collection of Adriatic shells gathered by Naccari and recently illustrated by BALLARIN et al. (2000). This correspondence throws light onto the activity of Italian natural history collectors in early XIX century, as to their favourite subjects, the bibliographic tools on which they relied, the extent and geographic distribution of their correspondents and, not the least, the ways they marketed their items.

RIASSUNTO Riproduciamo qui alcuni stralci dalle lettere che il naturalista chioggiotto Fortunato Luigi Naccari (1793-1860) inviò al canonico Luigi Ramello (1782-1854) negli anni 1820 e 1830-31 e che in larga misura interessano la vendita di una raccolta di conchiglie adriatiche realizzata dal Naccari e recentemente illustrata da BALLARIN et al. (2000). Questo carteggio getta luce sull'attività dei collezionisti di storia naturale italiani al principio del secolo XIX, con particolare riguardo agli oggetti che formavano di preferenza queste raccolte, alla bibliografia di cui disponevano, all'entità e alla distribuzione geografica della loro rete di corrispondenti e, non ultimo, ai modi con cui essi mettevano in commercio i loro materiali.

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INTRODUZIONE

In un recente lavoro (BALLARIN et al.2000) pubblicato in questa stessa rivista abbiamo aperto una finestra sul vivace ambiente naturalistico che ebbe per teatro la città di Chioggia, tra gli ultimi decenni del Settecento ed i primi decenni del secolo successivo. A tale nota rinviamo per un inquadramento della problematica e per una breve elencazione dei principali attori.

Abbiamo accennato, in tale sede, alle interessanti lettere che Fortunato Luigi Naccari (1793-1860) inviò negli anni 1820 e 1830-31 al canonico Luigi Ramello (1782-1854), in materia di collezioni naturalistiche.

Naccari, naturalista particolarmente versato in Algologia (e, comunque, in Botanica) che dal 1818 fu Professore di Storia Naturale e Bibliotecario presso il Seminario vescovile di Chioggia, nonché direttore del museo e del piccolo orto botanico annesso, dedicò non poche attenzioni alla fauna marina dell'Adriatico e, in particolare, ai Molluschi di questo mare, allestendone tra l'altro la collezione (comprendente peraltro anche specie continentali) che cedette al Ramello e di cui ci siamo occupati nel precedente contributo. Luigi Ramello (1782-1854), come abbiamo ricordato in tale occasione, fu sacerdote, letterato, naturalista, collezionista; dal 1804 fu insegnante nel Seminario vescovile di Rovigo, del quale fu Rettore dal 1824 al 1836.

Ci occupiamo in questa sede di una serie di lettere di Naccari a Ramello, che abbiamo rintracciato negli archivi dell'Accademia dei Concordi a Rovigo. Queste lettere, oltre a trattare della transazione relativa alla collezione di conchiglie, offrono un'ampia ed articolata finestra sull'attività scientifica di Naccari, sulle sue relazioni con il mondo scientifico italiano e straniero dell'epoca e, soprattutto, sul collezionismo naturalistico di un'epoca che di poco precede la nascita del primo grande museo naturalistico italiano, quello di Milano.

LE LETTERE

Quasi tutte le lettere che ci interessano appartengono ad un ristretto arco temporale, che va dagli ultimi mesi del 1830 all'estate dell'anno successivo. Vi è tuttavia una sorta di antefatto, nella lettera che Naccari invia a Ramello in data 16 dicembre 1820:

> Vengo assicurato, che un certo Sig.r Ghiro di costà possiede un ricco Gabinetto d'Uccelli da esso lui preparati. Mi rivolgo dunque a Lei, incoraggiato dalle cortesi espressioni, che tempo fa ebbe la bontà di esternarmi, onde pregarla a prestarsi in quest'oggetto, ed in pria di tutto a chiedere al med.o Signore, se avesse genio di far dei cambi ricevendo invece di Uccelli, degli Esseri marini del nostro Golfo, cioè Conchiglie, Madrepore, Millepore, Alcioni, Asterie, Echini, ec., oppur anco delli Pesci ben preparati, scarnati per la bocca, senza offendere con nessuna rottura la pelle, e conservati co' suoi naturali colori, cosa oltremodo difficile, di sommo dispendio, (specialmente per andarne di rotti in gran quantità) ma nello stesso tempo di non poca meraviglia, e piacere a vederli.
>
> E' certo che l'incremento dei Gabinetti si fà a forza di cambi, con questo principio vorrei ora camminare. Io ho in qualche quantità degli Esseri marini, ma sono mancante di Uccelli non avendone altro che dodici; ho pochissimi Insetti, e sono del pari scarso di minerali. Ella adunque mi assisti per quanto può [...]

Il 30 ottobre 1830 Naccari ringrazia per aver ricevuto 29.12 lire austriache. Le ha avute, sì, attraverso Ramello, ma - a quanto pare - da parte del Rev. Canonico Prof. Barbieri.[1] E' solo a questo punto che inizia il vero e proprio rapporto di compraven-

dita fra Naccari e Ramello:

> Colgo poi tale incontro per avvertirla, che se mai il suo Gabinetto mancasse di oggetti di Storia Naturale appartenenti alla mia messe, io sono al caso di poterla servire, e a discretissimi prezzi, e ricevendo anco in permuta dei libri (in cambio di tutto, o di parte del prezzo) nel caso ch'Ella avesse qualche opera che Le fosse inutile e della quale io fossi privo.
>
> Per esempio, io potrei fornirla di Conchiglie Adriatiche nomenclate, di zoofitti [sic], e di echinodermi. Di questi Esseri vendendoli in serie, misti cioè, comuni rari e rarissimi, io li darò per centesimi 30 per ogni esemplare. Potrei pure darle una serie di Alghe compresse di circa 80 o più esemplari tutti nomenclati secondo l'*Algologia Adriatica*,[2] e la *Flora Veneta*.[3] Ella ben sa, che a giorni nostri questi interessantissimi Esseri acquatici sono generalmente ricercati, perché in passato erano poco conosciuti, perché sono i veri protei del regno vegetabile, e perché è difficile e molto costosa la loro raccolta e sommamente arduo il loro studio, ec. Con essi possono formarsi anco dei quadretti per adornamento di un Gabinetto, giacché sembrano disegni miniati e fanno una vaga mostra posti sotto una candida lastra di cristallo a guisa delle stampe, ec. In quanto al prezzo trattandosi di esittare la detta serie posso restringermi a Centesimi 50 per ogni esemplare, sicché con Austr. £ 40 circa si ha una serie di vegetabili acquatici interessantissimi, e vaghi alla vista. Posso ancora esibirle delle Conchiglie fossili dei terreni calcareo-trappici del Vicentino; e di quelle dei terreni terziarj degli Appennini, dei contorni di Parigi, di Bordò, ec. Finalmente tengo doppie, e quindi disponibili, alcune opere di Storia naturale, come vedrà dalla nota quì a piedi [..]

Nella nota in questione troviamo elencati i volumi seguenti:

> Olivi, Zoologia Adriatica. In 4°. grande con rami[4] *Aust. £ 15*
> Suffren, Piante del Friuli. In 8°.[5] Libro raro " 6
> Bonnet, Contemplazione della natura. Vol. due in 8°[6] " 3
> Rudimenti di storia naturale considerata nel campo dell'utilità e delle produzioni naturali nella vita sociale. Vol. 3 in 8°. Milano, 1820-1821 " 5
> Dalechamp, Historiae generalis plantarum, Lugduni, ec.[7]
> Quest'opera è in foglio, in due volumi grandi uniti in uno, e pienissima di rami. E' assai rara " 100
> Imperato, Historia Naturale, ec. con fig.[8] " 15

Ramello abbocca subito. Il 7 dicembre 1830 Naccari gli scrive infatti:

> Mi fu gratissima ed onorevolissima la sua ordinazione delle *Alghe adriatiche*, e m'affretto a servirla di tutto genio facendole tenere una serie estesissima forte di N°: 130 esemplari. Io le aveva scritto che avrò una serie di circa 80 esemplari, e ciò è vero; ma trattandosi che ne aveva in pronto un altra, ch'è la presente, per mandarla al Prof.r Kunze[9] di Lipsia, ho pensato di spedire la più ricca a Lei, sì perché mi piace anteporre i nazionali, e sì perché Lei mi dà lusinga di poterla servire in altri oggetti, e finalmente perché i luoghi di pubblico insegnamento meritano a mio vedere la preferenza. Ad onta poi che questa serie è più ricca della (da prima) esibita, e che quindi racchiude le alghe rarissìme e che vengono pagate (prese però isolatamente ossia in piccolo numero) da Aus.e Lire sei alle dodici per esemplare, pure io non voglio alterare la mia dimanda fattale di centesimi 50 per ogni numero; sicché Ella mi farà tenere con tutto suo comodo Austriache Lire 65, cioè Venete 113:15.
>
> Ora sono occupato moltissimo a studiare tutte le Alghe Europee, che mi sono in massima parte procurato, con abbondante spesa, per poter formare un'opera intitolata *Algologia Europea*.[10] Ne ho acquistate dai principali botanici viaggiatori, cioè dall'Hoppe,[11] dal Sieber,[12] dal Waihe,[13] dal Tausch,[14] dal Salder,[15] dal Lange, dal Rochel,[16] dal Jan,[17] dal Schleicher,[18] dal Salzmann,[19] dal Poppig,[20] ec.ec.
>
> Sento ch'ella in seguito vorrà acquistare de' Zoofitti [sic], degli Echinodermi, e delle Conchiglie, e quindi io l'assicuro ch'io sarò sempre pronto a servirla e con discretissimi prezzi, e di gran lunga inferiori a quelli di certi signori, che fanno propriamente spaventare. Anco in questo punto ricevo una nota dal Sig.r Senoner[21] di Roccie e fossili, e trovo che li prezzi cominciano da Aust.e Lire 3, fino alle 16 per ogni esemplare. Ma per Bacco è un po' troppo! Se Ella desidera qualche cosa anco in questo ramo, potrà indicarmi con qualche notarella.
>
> Mi piace il suo pensiero circa il suo nascente gabinetto, ma solo ardisco umilmente di porle in vista, che il Sistema di Linneo per le Conchiglie non può più aver luogo al giorno d'oggi, e che il migliore sembra quello di Lamarck nella sua opera *Histoire Naturelle des Animaux sans vertebres* [sic]. I generi Linneani non possono certo abbracciare tutte le conchiglie che conosciamo, e che possediamo. Anzi per le nostre Adriatiche, e Mediterranee, non abbiamo fino ad ora il miglior libro dell'opera del Sig.r B.C. Payraudeau = *Catalogue descriptif et methodique des annelides et des mollusques de l'ile de Corse, avec huit planches représentant quatre-vingt-huit espèces, dont soixante-huit nouvelles. - Paris 1816.* Le tavole sono eccellenti e rappresentano buona parte delle nostre conchiglie nuove. Per le conchiglie terrestri e fluviatili poi è affatto necessaria l'opera di Draparnaud = *Histoire des Mollusques de la France.* Paris 1805. Compatisca per carità se ho ardito di suggerirle tal cosa, perché io non intendo menomamente di voler fare il pedante, e di volere insegnare a Lei, ma solo di avvertirla ch'io userò di queste determinazioni, poiché potrei bensì nominarle gli oggetti alla Linneana, ma ciò può essere solo nelle specie conosciute e nominate dal Linneo, ec.
>
> Colgo quest'incontro per farle la seguente esibizione. Io sono incombenzato della vendita di un Erbario ch'era del defunto nostro botanico cittadino Ab. Fabris.[22] Il prezzo del d.o Erbario è di Aust.e Lire 200, e mi sembra discretto [sic] avuto in vista quello che mi costò il mio formato un poco per volta. Io lo avrei acquistato se non possedessi già

le stesse piante nel mio. Il comprare le cose unite e raccolte è certamente la miglior cosa, poiché ho imparato a mie spese, che il formarsi le raccolte è una spesa continua. Io Le spedisco quindi il catalogo, ed Ella esamini se ciò a Lei può star bene, e con tutta la più estesa libertà mi saprà dire se vorrà o no acquistarlo. La prego solo di rispedirmi il d:o Catalogo nel caso ch'Ella non amasse di acquistare le dette piante. In quanto alla conservazione di questo erbario posso assicurarla d'averne esaminato qualche fascicolo, e di averlo ritrovato in uno stato sufficiente, e soprattutto nelle piante forestiere e di maggior interesse; e se ho trovato qualche cosa di male, o di tarlato, od altro lo trovai nelle piante de' nostri fruttaj, e che quindi è facilissimo di poter rimettere, ec. Ella dunque mi scrivi la sua volontà con tutta la libertà, e (permetta che il dica) con tutta l'amicizia, e senza il più piccolo riguardo; poiché se Ella non aspira a quella comprita potrò facilmente procurare la vendita di un tale Erbario per la sola somma di Aust.e Lire 200. Se poi Ella crederà di acquistarlo, mi farà grazia d'indicarmi come devo farlo a Lei pervenire, essendo voluminoso, ossia composto di grandi e grossi fascicoli XVII. [..]

Non siamo in grado di accertare la sorte di questo erbario. Quel che è certo, invece, è che presto arriva, da parte di Ramello, l'ordine per una raccolta di conchiglie adriatiche. Scrive infatti Naccari a Ramello in data 20 febbraio 1831:

Con la presente le accuso la ricevuta della gratissima sua del dì 26 del passato Gennajo, e delle Aust.e Lire 48 a conto del prezzo della raccolta di Alghe Adriatiche. A tutto suo comodo Ella potrà farmi tenere le rimanenti Aust.e Lire 17 a saldo della raccolta stessa, e ciò collo stesso mezzo del Sig.r Francesco Beadino che viene quasi ogni settimana al mercato di Rovigo, e che ha il suo ricapito presso al Caffé dei Mercanti. La sua ordinazione per una serie di Conchiglie dell'adriatico [sic] mi fa onore, e non mancherò di servirla quanto prima mi sarà possibile al discrettissimo [sic] prezzo di centesimi 30 per esemplare, come le ho esibito in passato. In questa serie ve ne saranno parecchie di comuni, ma ne troverà anche parecchie di rarissime e di costosissime e spero che resterà contento. L'altr'jeri, per esempio, ho acquistato un'*Argonauta argo* da un raccoglitore, e lo pagai tre talleri per averlo, e perché la serie non sia mancante di questa interessantissima conchiglia. Ho pure acquistata la *Marginella subtilissima*[23] per un zecchino, e varie altre di questo calibro, ec. Il Catalogo sarà poi munito di alcune osservazioni (se Ella me lo permette) non per Lei, che non ha per certo bisogno delle mie indicazioni, ma solo pei giovani studiosi del suo illustre Seminario.

Nel momento che ho ricevuto la favorita sua, aveva già spedito il mio *Piano dell'Algologia Europea* all'amico Conte Orsi di Verona perché lo inserisca nel nuovo Giornale nominato *Poligrafo*.[24] Io mi sono deciso in questo sul desiderio di vedere pubblicato questo mio *Piano*, in un'opera che viene diffusa, e perché essendomi stata affidata la parte di quest'opera che riguarda le Scienze naturali posso stampare in quella senza alcuna spesa. Questo però non impedisce che il mio *Piano* non possa essere stampato anco in altro modo, ed in altro tempo, ed anco separatamente da Giornali, ec. [..]

Proposte ulteriori di vendita e tentativi di promuovere ulteriormente la sua progettata *Algologia Europea* ritornano nella successiva lettera del 21 marzo 1831:

Mi prendo l'ardire d'inviarle una mia Memorietta mass.tta, pregandola di leggerla, o di farla leggere, all'Accademia di Rovigo in quella giornata che crederà la più opportuna. Questa risguarda delle osservazioni intorno a delle piante fanerogame acquatiche che ho dovuto fare nel mare. Voglio credere che anco nell'anno passato sarà stato letto il mio *Piano d'una Algologia Europea*.[25]

In questi ultimi tempi fui molto occupato non solo nella raccolta delle alghe marine, ma anco ne' piccoli zoofitti [sic] marini che più si avvicinano alle alghe, cioè nelle *Sertularie*, nelle *Tubularie*, nelle *Millepore*, ec. Ne ho sistemate e nomenclate diverse di assai rare e belle, molto più ch'ora possedo un eccellente microscopio colle Lenti dell'Amici,[26] ec.

Le spedisco la presente col solito mezzo del Sig.r Beadin,[27] e se Ella fosse al caso mi farebbe un piacere di mandarmi collo stesso mezzo il saldo del mio credito che consiste in Aust.e £ 20:4,[28] che quantunque piccola somma, pure mi sarebbe giovevole per le continue spese che sono costretto continuamente di fare, ec. [..]

Pochi giorni dopo (30 marzo 1831) Naccari riprende in mano la penna per toccare, con insistenza, i soliti temi:

Dopo averle scritta la mia lettera ho ricevuto la gradita sua del dì 19 corr.e, perciò non posso che rinovarle ch'io sono creditore di Aust.e Lire 20:4, perché l'ultimo suo contamento fu di Aust.e Lire 24., e solo il penultimo (dei 4 Agosto pass.°) fu di 48. Ella dunque potrà consegnare al Sig.r Beadino le Aust.e Lire 20:4, e così resteranno pareggiati i nostri conti fino ad ora seguiti.

Io sono poi prontissimo a compiacerla col farle aumentare la sua collezione. Io Le offro dei *zoofiti* nomenclati (che forse saranno in numero di circa 40 da quanto al momento mi sembra mentalmente di ricordarmi), tra quali ve ne sono alcuni di comuni, ma la maggior parte sono rari, ed alcuni rarissimi ed interessanti. *Per esemp.* tra questi troverà l'*Antipathes Larix* di *Lamk.*,[29] e di *Lamour.*[30] ch'essi trovarono nel nostro Adriatico, ma che non fu trovato prima d'ora da nessun Italiano, in maniera che noi non potevimo comprendere cosa fosse questa rara specie. Nel passato autunno ho avuto la fortuna di ritrovarla e ne ho mandato anzi un esemplare al chiariss. amico Prof: Bertoloni[31] di Bologna che lo ha moltissimo aggradito, perché si è convinto che questa è una specie vera ed interessante, e non una specie spuria o sognata. Se Ella è dunque contenta di acquistare questi zoofiti, io li cederò pel ristretto e modico

prezzo di Italiane Lire una per ogni esemplare. Sono certo che resterà contenta sul riflesso che con piccola somma si acquista una interessante raccolta nomenclata e senza nessuno disturbo. Con Lei uso questi prezzi, ma coi forestieri voglio molto di più, perché anco essi sono carissimi, ec. Se Ella volesse anco gli Echinodermi (saranno 30, o in circa) posso egualmente servirla.

In quanto poi ai granchi potrò servirla forse in seguito, ma al presente sono scarso, perché la mia raccolta di granchi, abbandonata e lasciata da me in un canto, ha molto sofferto nel colorito; e poi sono malconci e sconnessi dall'acido muriatico, loro implacabile nemico, e dagl'insetti, ec. Col tempo dunque quando avrò dei granchi in buon stato e ben conservati non mancherò di avvertirla.

Finalmente l'avverto che se avesse bisogno di petrificati[32] potrò servirla.[..]

Il 15 aprile 1831:

Le accuso la ricevuta della graditissima sua lettera e della Doppia di Genova, che riceverò quanto prima, giacché il Sig.r Beadino mi scrive di averla ricevuta, e che me la spedirà con sicuro incontro. Questa dunque forma Aust.e £ 94:96, e nel venturo Maggio potrà spedirmi il rimanente, cioè Aust.e £ 75:4 per il resto delle conchiglie, e Aust.e £ 17 per le Alghe, che formano in tutto Aust. £ 92:4.

Mi è di vero dispiacere il conoscere dalla d:a favorita sua lettera, che'Ella fu poco contento delle conchiglie, ma certamente non è mia la colpa. Ella mi ha scritto nel dì 26 9bre passato d'avere 600, e più pezzi, ed io Le risposi ch'è moltissimo, ed anzi ritengo che tutto questo numero non può essere di conchiglie *Adriatiche*, poiché né il Renier, né io, e né altri arrivarono ad un sì vistoso numero di specie. Nella sua poi del 26 Gennajo passato si degnò di ordinarmi una serie di *conchiglie dell'adriatico* [sic] nomenclate dietro il metodo di Lamarck, che servirebbe (come Ella mi onorò di dirmi) alla correzione delle sue tracciate su quel del Linneo. Ecco dunque che conosceva fin d'allora di averle, e che poche cose nuove io poteva aggiungerle. Tutte quelle poi che furono da me segnate per *rare*, e per *rarissime* sono in fatto tali, e tali le chiamarono anco l'Olivi, il Renier, il Brocchi, e quanti hanno parlato delle conchiglie Adriatiche; e se Ella è molto fornito di queste specie, ciò vuol dire che la sua collezione è molto ricca, e che ha avuto la fortuna e l'opportunità di poterle avere. Così pure se nell'Elenco Ella ha trovato vari nomi, nonostante la nomenclatura di Lamarck, a Lei sconosciuti, ciò vuol dire ch'Ella pure è perfettamente a giorno ed a livello dello stato attuale della Conchiologia, cosa che Le fa molto onore.

Se dunque in quest'incontro non ho potuto esserle utile, La prego di compatire la mia impotenza, la mia tenuità, in vista almeno della mia buona volontà che ho di servirla. Intanto mi auguro una qualche occasione propizia per poterle meglio mostrare ch'io sono quale con la massima considerazione mi rassegno.

Alla vendita di alghe e di conchiglie si sovrappone un'altra transazione, di oggetto sconosciuto, di cui è traccia in una lettera datata 11 maggio 1831. Scrive infatti Naccari:

In questo punto ho ricevuto la gratissima sua del giorno 7 corr.e, unitamente ad altra lettera del Sig.r Beadino, il quale mi avvisa di avere da Lei ricevuto le Aust.e Lire 20:4, che quanto prima mi farà avere con sicuro incontro. Io dunque colla presente m'affretto di accusarla la ricevuta del saldo del nostro affare, avend'Ella pagato tutto il suo piccolissimo debito.

Nelle future vacanze spero dunque di poter aver l'onore della sua preziosa visita, e di potere fors'anco servirla dei zoofiti ed echinodermi ec. Se poi Ella gradisse di avere anco prima questi oggetti, per pagarli solo nell'epoca delle vacanze io tanto e tanto sarò pronto a servirla al primo suo cenno, essendomi cosa gratissima il poter seguire il suo genio ed i suoi comandi. Già il Sig.r Beadin viene ogni Martedì al mercato di Rovigo, ed ha il suo ricapito al Caffé dei Mercanti, sicché Ella può scrivermi col suo mezzo in ogni tempo ciò che Le potesse occorrere. [..]

Dai documenti in nostro possesso non risulta però che Ramello abbia acquistato da Naccari altre collezioni. Il 20 luglio 1831, infatti, Naccari si trova addirittura nella necessità di sollecitare il pagamento di quanto da tempo gli spetta:

Colla gratissima sua del dì 9 Aple passato Ella mi ha graziato di spedirmi una Doppia di Genova (Aust.e £ 94.96) a conto del mio avere, e mi ha gentilmente promesso di spedirmi tutto il residuo per le conchiglie e per le Alghe, entro il veniente Maggio, consistente in Austriache Lire 92:4. Non avendo adunque ricevuto per anco questo residuo mi fo ardito a pregarla di spedirmelo col mezzo del Sig.r Beadin, perché devo confessarle di essere bisognoso di denari, per supplire a delle comprite non indifferenti di libri nuovi ultimamente acquistati, e de' quali Ella vedrà presto mie notizie nel *Poligrafo* di Verona, del quale sono collaboratore per ciò che spetta alle Scienze Naturali. Ella non può mai immaginarsi cosa io abbia speso in quest'anno in Libri! Come si fa a continuare in questa guisa? E come si fa' a continuare la carriera senza essere a livello della Scienza? [..]

È cambiato molto, da allora, il mondo del collezionismo naturalistico? Lasciamo al lettore la risposta a questo interrogativo, promettendogli invece di continuare nelle nostre ricerche sui naturalisti chioggiotti del primo Ottocento, sulle orme dell'ottima monografia che GIBIN (1994) ha dedicato al più celebre fra questi, quel Giuseppe OLIVI la cui *Zoologia Adriatica* (1792) rappresentava per Naccari il primo e più ovvio fra i riferimenti bibliografici, soprattutto – ma non solo – in materia malacologica.

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Gibin C., 1994 - *La geometria della natura: Chioggia e l'Europa nella vicenda intellettuale di Giuseppe Olivi naturalista del Settecento*. Il Poligrafo, Padova, 173 pp.

Olivi G., 1792 - *Zoologia Adriatica, ossia catalogo ragionato degli animali del Golfo e delle Lagune di Venezia; preceduto da una dissertazione sulla storia fisica e naturale del Golfo; e accompagnato da memorie, ed osservazioni di fisica storia naturale ed economia*, Remondini, Bassano, [x]+334+xxxii pp., ix tavv.

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1 D. Giuseppe Barbieri, prefetto degli Studi del Seminario vescovile di Rovigo.

2 Naccari F.L., *Algologia Adriatica*, 97 pp. in quarto. Bologna, typ. Cardinali e Frulli (1828).

3 Naccari F.L., *Flora Veneta, o descrizione delle piante che nascono nella provincia di Venezia, arricchita di osservazioni medico-economiche*, 6 voll, in quarto di pp. 127, 135, 170, 150, 142, 133. Venezia: Bonvecchiato (1826-28).

4 V. la bibliografia alla fine dell'articolo.

5 Suffren Palamede de, *Principes de botanique extraits des ouvrages de Linné et suivi d'un Catalogue des plantes du Frioul et de la Carnia, avec le nom des lieux, où on les trouve*, 208 pp. in octavo. Venice, chez Antoine Rosa (1802).

6 Bonnet Ch., *Contemplation de la nature*. Si tratta verosimilmente della traduzione italiana, curata da L. Spallanzani, pubblicata a Venezia, presso Giovanni Vitto, nel 1773, in 2 volumi di pagine 152+335; 348.

7 Dalechamps J., *Historia generalis plantarum in libros XVIII per certas classes artificiose digesta, haec, plusquam mille imaginibus plantarum locupletior superioribus, omnes propemodum quae ab antiquis scriptoribus graecis, latinis, arabibus, nominantur; nec non eas quae in Orientis atque Occidentis partibus ante seculum nostrum incognitis, repertae fuerunt, tibi exhibet. Habes etiam earundem plantarum peculiaria diversis nationibus nomina: habes amplas descriptiones, e quibus singularum genus, formam, ubi crescant, et quo tempore vigeant, nativum temperamentum, vires denique in medicina proprias cognosces. Adjecti sunt indices, non solum graeci et latini, sed aliarum quoque linguarum locupletissimi*. Lugduni, apud Gulielmum Rovillium. 2 voll. in folio, di complessive 1922 pagine (+appendix et indices) (1587).

8 Imperato F., *Dell'historia naturale libri xxviii*. Napoli. Dato il prezzo, potrebbe trattarsi della seconda edizione, con l'aggiunta di alcune annotazioni alle piante nel libro xxviii, di Giovanni Maria Ferro (1672, 696 pp., in folio. Venetia, presso Combi), piuttosto che della prima edizione napoletana del 1599.

9 Gustav Kunze (1793-1851), professore a Lipsia, autore tra l'altro di alcuni lavori di entomologia.

10 Opera non pubblicata.

11 David Heinrich Hoppe, bairischer Hofrath (Vilsen (Hannover) 15 dicembre 1760 - Regensburg, 1° agosto 1846).

12 Franz Wilhelm Sieber (Prag 1785 - Prag, in manicomio, 17 dicembre 1844).

13 Probabilmente, Karl Enrst August Weihe (Minden, ?-1834), medico e botanico.

14 Ignaz Friedrich Tausch (m. Prag 1848).

15 Joseph Sadler, professore a Pesth (Pressburg 6 maggio 1791 - Pest 1849).

16 Anton Rochel (Neunkirchen am Steinfeld nell'Austria inferiore 18 giugno 1770 - Grätz 12 marzo 1847).

17 Giorgio Jan (Vienna 1791-Milano 1866), di origine ungherese, fu dapprima impiegato al Museo di Vienna, quindi professore di Botanica all'Università di Parma. Rinunciò alla cattedra e si trasferì a Milano dove fondò e diresse il Museo civico di Storia Naturale. È autore di una monumentale *Monographie générale des Ophidiens* (1860-66).

18 J.C. Schleicher (svizzero di Bex).

19 Philipp Salzmann (Erfurt 27 febbraio 1781 - Montpellier 11 maggio 1851).

20 Eduard Friedrich Poeppig, professore di Zoologia all'università di Lipsia (Plauen im Vogtlande 16 luglio 1798 - Lipsia 4 settembre 1868).

21 Dr. Gaetano Senoner di Venezia. Risulta tra i collaboratori del giornale *Il Poligrafo* nel 1832.

22 Giuseppe Fabris (Chioggia 1735-1794), medico e botanico.

23 Nel Catalogo, al numero 60, figura «Pandora rostrata? *Lam.* E' la *Marginella subtilissima* del Renier. Questa pure è rarissima e costosissima». Dovrebbe trattarsi di *Pandora inaequivalvis* (Linnaeus, 1758) = *rostrata* Lamarck, 1818.

[24] *Il Poligrafo: giornale di scienze, lettere ed arti* edito a Verona dal 1830 al 1845. Ne fu direttore Giovanni-Girolamo Orti. Fino al 1833 ne furono pubblicati 16 tomi, a cura della Tipografia del Gabinetto Letterario. Dal 1834 iniziò una nuova serie, pubblicata dalla Tipografia Poligrafica di G. Antonelli. Questo giornale comprendeva 8 sezioni:

I Scienze gravi (scienze sacre, matematica, filosofia morale, giurisprudenza, economia pubblica)

II Scienze naturali (storia naturale, zoologia, botanica, geologia, mineralogia, fisica, chimica, astronomia)

III Scienze mediche (anatomia, fisiologia, patologia, farmacologia, chimica, igiene, chirurgia, veterinaria)

IV Cosmologia (storia, cronologia, archeologia, geografia, statistica)

V Letteratura (filologia, orazioni, novelle, romanzi, poesia, mitologia)

VI Belle arti (pittura, scultura, architettura, incisione, musica)

VII Arti (agricoltura, orticoltura, economia rurale, economia domestica, arti chimiche, arti meccaniche, arti economiche, arti economiche, strategia)

VIII Varietà (opere ed istituzioni enciclopediche, viaggi, biografia, necrologia, osservazioni meteorologiche)

Naccari vi collaborò dal 1831 al 1833 scrivendo recensioni di varie opere naturalistiche. Nel 1831 Antonio Bertoloni vi recensì l'*Algologia Adriatica*. L'Accademia dei Concordi di Rovigo ne possiede le annate 1830-31, che non sono invece presenti nella Biblioteca del Seminario della stessa città.

[25] Pubblicato nel vol. VII de *Il Poligrafo*, alle pp. 213-216.

[26] A Giovanni Battista Amici (1786-1863), astronomo, ottico, naturalista e ingegnere, professore di matematica a Modena (1815-1825), poi (dal 1831) astronomo presso il museo di fisica e storia naturale di Firenze, si devono sia la messa a punto di nuove tecniche microscopiche (in particolare, con il perfezionamento delle lenti acromatiche e con l'introduzione del metodo di osservazione per immersione), sia la prima descrizione (nel 1823) del budello pollinico.

[27] Beadino nella lettera del 20 febbraio 1831.

[28] 17 per le alghe, e le altre 3:4?

[29] Cf. nota 45.

[30] Jean Vincent Félix Lamouroux (1779-1825) trattò di polipi coloniali in diverse sue opere uscite fra il 1816 e il 1826.

[31] Antonio Bertoloni (Sarzana 11 febbraio 1775 - Bologna 17 aprile 1869) fu professore di Botanica nell'università di Bologna.

[32] Fossili.

Lavoro accettato il 3 Luglio 2000

The genera *Bacteridium* Thiele, 1929 and *Careliopsis* Mörch, 1875 (Gastropoda: Pyramidellidae) from the east coast of South America

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KEY WORDS: Pyramidellidae, *Bacteridium*, *Careliopsis*, taxonomy, South America.

ABSTRACT *Bacteridium bermudensis* (Dall & Bartsch, 1911) and *Careliopsis styliformis* (Mörch, 1875), originally described from the Caribbean region, are reported for the first time from the coast of Brazil. Previous reports of *Bacteridium resticulum* (Dall, 1889) from the coast of Brazil were based on misidentifications of specimens of *B. bermudensis*, although *B. resticulum* is indeed present along the coast. Reports of *Eulimella bermudensis* from the coasts of Argentina and Uruguay were based on misidentifications of *C. styliformis*. *Bacteridium bartschi* (Dall & Bartsch, 1911) is synonymized with *B. bermudensis*; and *Bacteridium octona* (Guppy & Dall, 1897) with *B. resticulum*, for which a lectotype is designated.

RIASSUNTO *Bacteridium bermudensis* (Dall & Bartsch, 1911) e *Careliopsis styliformis* (Morch, 1875), originariamente descritte per la Regione Caraibica, sono segnalate per la prima volta per le coste del Brasile. Sebbene presente anche sulle coste del Brasile, le precedenti segnalazioni di *Bacteridium resticulum* (Dall, 1889) erano basate su errate identificazioni di esemplari di *Bacteridium bermudensis*. Le segnalazioni di *Eulimella bermudensis* per le coste dell'Argentina e dell'Uruguay erano basate su errate identificazioni di esemplari di *C. styliformis*. *Bacteridium bartschi* (Dall & Bartsch, 1911) è posto in sinonimia con *B. bermudensis*, e *Bacteridium octona* (Guppy & Dall, 1897) con *B. resticulum* per il quale è stato qui designato un lectotipo.

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INTRODUCTION

Although knowledge of the taxonomy of the family Pyramidellidae Gray, 1840 along the Mediterranean and Atlantic coasts of Europe and Africa has been growing in recent decades, with numerous contributions (e.g. Micali, et al., 1993; Nofroni & Schander, 1994; Nofroni & Tringali, 1995; Peñas & Rolán, 1997a, b, 1998, 1999a, b, c, 2000; Peñas et al., 1996, 1999; Schander, 1994, 1995; Van Aartsen, 1977, 1981, 1987, 1994; Van Aartsen et al., 1998; Warén, 1991 and Wilke & Van Aartsen, 1998), the same cannot be said of the Atlantic coast of South America. Here, only two extensive investigations have been carried out, restricted to the coast of Argentina (Castellanos, 1982; Farinati, 1993). For the rest of the Atlantic coast of the continent, we have only general catalogues of mollusks that comment only occasionally and superficially on the pyramidellids (Rios, 1985, 1994; De Jong & Coomans, 1988; Merlano, & Hegedeus, 1994).

The Pyramidellidae is one of the least known marine mollusk families. Its taxonomy is much confused, with over 300 named supraspecific taxa (Schander, 1994), which are often misemployed. There is no general consensus about the definitions and limits of most of the genera and subgenera.

This study deals with the taxonomy of the Brazilian species of *Bacteridium* Thiele, 1929 and *Careliopsis* Mörch, 1875, herein treated as genera as proposed by Van Aartsen (1994), Schander (1994), and Peñas et al. (1996).

MATERIAL AND METHODS

The determination of the material was based on comparisons with type material and/or original descriptions and illustrations. The terminology used for the protoconchs is based on that proposed by Van Aartsen (1981, 1987) and modified by Van Der Linden & Eikenboom (1992) and Schander (1994). In the material examined, listed separately for each species, the number between brackets indicates the number of shells in each lot.

Abbreviations used in this paper: —Institutions: ANSP - Academy of Natural Sciences of Philadelphia, Philadelphia, USA; BMNH - British Musum of Natural History, London, UK; IBUFRJ - Instituto de Biologia / Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil; MNHN - Muséum National d'Histoire Naturelle, Paris, France; MORG - Museu Oceanográfico "Eliézer de Carvalho Rios", Fundação Oceanográfica do Rio Grande, Rio Grande, Brazil; USNM - National Museum of Natural History, Washington, USA; ZMA - Zoölogisch Museum Amsterdam, Amsterdam, The Netherlands. —Expeditions: AMASSEDS: A Multidisciplinar Amazon Shelf SEDiment Study, collector Research Vessel "Columbus Iseling"; PADCT - Programa de Apoio ao Desenvolvimento Científico e Tecnológico, collector Research Vessel "Prof. W. Besnard"; REVIZEE - REcursos VIvos da Zona Econômica Exclusiva, collector Research Vessel "Almirante Saldanha".

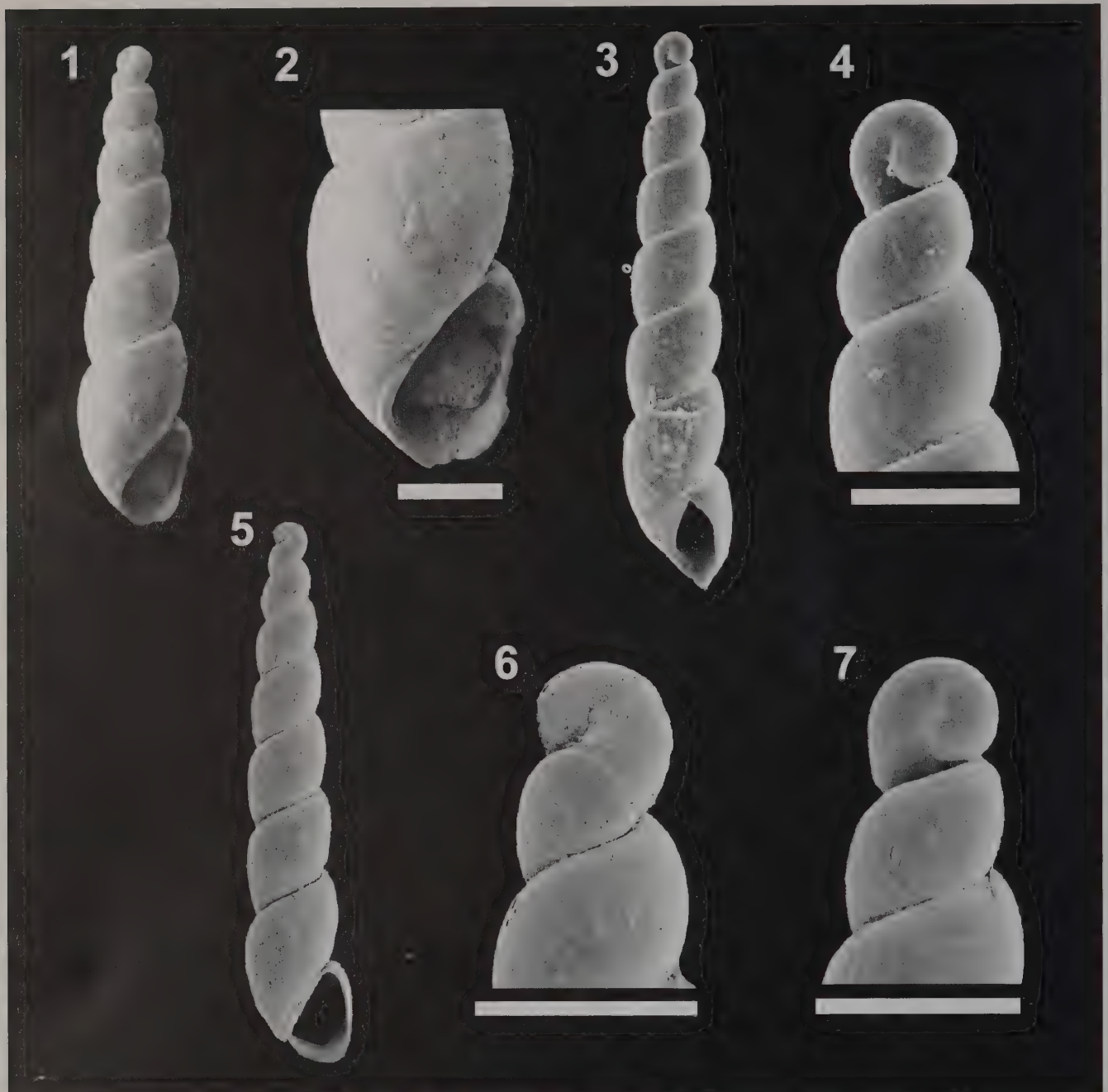



Fig. 1-7: *Bacteridium bermudensis* (Dall & Batrsch, 1911). Figs. 1-2: holotype (USNM 221614, Bermuda), length: 1.7 mm; figs. 3-4: holotype of *Turbonilla bartschi* Aguayo & Rehder (USNM 420975, la Correra, Cuba), length: 2.1 mm; figs. 5-7: shell from Praia de jaguaribe, Pernambuco state, Brazil (MNHN), length: 2.2 mm. All scale bars: 200 µm.

RESULTS AND REMARKS

Family Pyramidellidae Gray, 1840

Genus *Bacteridium* Thiele, 1929

Type species by original designation: *Eulimella (Bacteridium) praeclara* Thiele, 1929.

Diagnosis

Shell small, slender, translucent, smooth or with fine spiral striae; whorls somewhat shouldered below sutures; without columellar fold; protoconch heterostrophic elevated of type A.

Remarks

The genus *Bacteridium* was introduced by THIELE (1929) as a subgenus of *Eulimella* Forbes & MacAndrew, 1846, to include *Eulimella* (*Bacteridium*) *praeclara*, the type species of the subgenus. The taxon *Bacteridium* was later raised to genus level (PEÑAS et al., 1996).

WARÉN (1995) created the new pyramidelloidean family Ebalidae to include some genera previously assigned to the Pyramidellidae: *Ebala* Gray, 1847; *Henrya* Bartsch, 1947; and *Murchisonella* Mörch, 1875. These genera are characterized by a "jaw apparatus" quite distinct from that of other pyramidellid genera (WARÉN, 1995). VAN AARTSEN (1995) showed that *Ebala* should be replaced by *Anisocycla* Monterosato, 1880, and that the new family created by WARÉN (1995) should then be renamed Anisocyclidae VAN AARTSEN, 1995.

Certain genera belonging to the family Pyramidellidae, such as *Bacteridium*, lack the "jaw apparatus" and cannot be distinguished from the genera included in Ebalidae (=Anisocyclidae) by shell morphology alone (WARÉN, 1995).

In the absence of soft parts of the specimens examined for this study, we believe that it is better to include them in *Bacteridium*, because of the similarity between them and the type species of this genus.

Bacteridium bermudensis **(Dall & Bartsch, 1911) comb. nov. (Figs. 1-7)**

Turbonilla (*Careliopsis*) *bermudensis* Dall & Bartsch, 1911: 279, pl. 35, fig. 4.

Turbonilla (*Careliopsis*) *bartschi* Aguayo & Rehder, 1936: 267, pl. 24, fig. 7; new synonymy.

Careliopsis octona sensu: De Jong & Coomans (1988: 131, pl. 21, fig. 680): Merlano, & Hegedeus (1994: 236, pl. 69, fig. 943).

Stylopsis resticula sensu: Mello (1990: 40, fig. 4); Vokes & Vokes (1983: 32, pl. 22, fig. 3); Rios (1994: 189, pl. 62, fig. 881); Barros (1994: 109, fig. 3k).

Types and type locality

Holotype: USNM 221614, Bermuda; holotype of *Turbonilla bartschi* Aguayo & Rehder, 1936, USNM 420975, La Correra, Cuba, P. J. Bermudez coll.

Material examined

The types above and: —West Indies: ZMA, [15] Aruba, F. Verbene coll.; —Brazil: MNHN, [2] off Recife, Pernambuco State, 1984-89, Maestrati coll.; MNHN, [4] Praia de Jaguaribe, Itamaracá, Pernambuco State, 1984-89, Maestrati coll.; MNHN, [4] Cabo, Pernambuco State, 1984-89, Maestrati coll.; MORG 25780, [1] Abrolhos, Bahia State (5 m), L. Barcellos coll.; MZUSP 30902, [1] Barra do Saí, Rio de Janeiro State.

Diagnosis

Shell very small, elongated and slender. Protoconch of type A, elevated. Teleoconch with about six whorls with convex profiles. Axial and spiral sculpturing absent. Sutures deeply impressed. Base elongated, aperture pyriform, inner lip slightly curved and somewhat projected into the base. Length of holotype 1.8 mm.

Remarks

DALL & BARTSCH (1911) originally placed *Bacteridium bermudensis* (figs. 1-7) in the genus *Turbonilla* Risso, 1826. In other works, the species has been allocated to the genera *Eulimella* (by CASTELLANOS, 1982; ZAFFARONI, 1989; FARINATI, 1993) and *Careliopsis* (by DE JONG & COOMANS, 1988; MERLANO & HEGEDEUS, 1994). Nevertheless, the species fits better in the description of the genus *Bacteridium* Thiele, 1931, being very similar to the type species of this taxon, *Eulimella* (*Bacteridium*) *praeclara* Thiele, 1925: 256, fig. 242.

The specimens studied by CASTELLANOS (1982), ZAFFARONI (1989), and FARINATI (1993) are not *B. bermudensis*, but *Careliopsis styliformis* (Mörch, 1875) (see discussion of next genus).

DALL & BARTSCH (1911) reported the existence of "...about 19 somewhat sinuous, slender, depressed, rounded, spiral threads..." in the shell of *B. bermudensis*. Despite the eroded state of the holotype of *B. bermudensis* (fig. 1), its surface has less eroded regions (fig. 2), making it clear that the species does not have such ornamentation. Examination of 15 specimens from Aruba and others from the northeast coast of Brazil (fig. 5-7), all identical to the holotype of *B. bermudensis*, revealed smooth shells, confirming the absence of spiral sculpture.

DE JONG & COOMANS (1988) illustrated two specimens allocated to the genus *Careliopsis*. The specimen named *C. octona* Guppy & Dall, 1897 (p. 131, pl. 21, fig. 680) is actually a specimen of *B. bermudensis*, and the other, named *C. bermudensis* (p. 131, pl. 21, fig. 681) is *Bacteridium resticulum* (see below). MERLANO & HEGEDEUS (1994: p. 236, pl. 69, figs. 943 and 944) made similar misidentifications in treating material from the Caribbean coast of Colombia.

The holotype of *Turbonilla bartschi* Aguayo & Rehder, 1936 (fig. 3-4) is identical to the holotype of *B. bermudensis,* and *T. bartschi* should therefore be considered its junior synonym.

VOKES & VOKES (1983) illustrated specimens of *B. bermudensis* identified as *Stylopsis resticula* Dall, 1889, from the Yucatan Peninsula, and RIOS (1994), MELLO (1990), and BARROS (1994) did the same for specimens from the northeast coast of Brazil. All the specimens illustrated are smooth and identical to the type of *B. bermudensis*. The type of *S. resticula* (see discussion below) has spiral striae and larger dimensions than *B. bermudensis*.

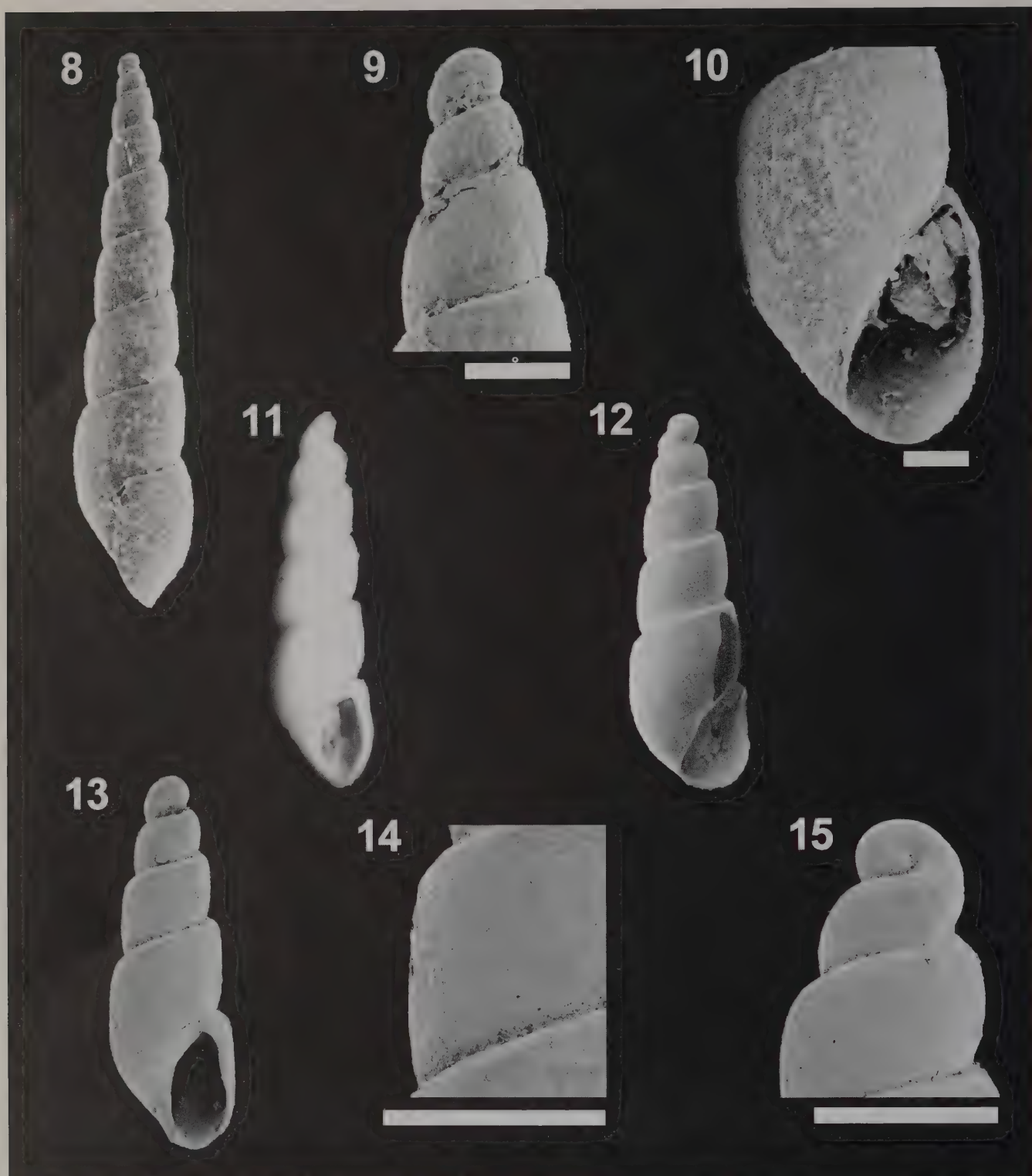
Thus, *B. bermudensis* is now considered to occur in Bermuda (type locality), the Yucatan Peninsula (VOKES & VOKES, 1993), Cuba (AGUAYO & REHDER, 1936), Aruba (DE JONG & COOMANS, 1988), the Caribbean region of Colombia (MERLANO & HEGEDEUS, 1994), and the northeast coast of Brazil (MELLO, 1990; RIOS, 1994; BARROS, 1994).

Bacteridium resticulum **(Dall, 1889) comb. nov. (Figs. 8-15)**

Turbonilla resticula Dall, 1889: 338.

Turbonilla (*Stylopsis*) *octona* Guppy & Dall, 1897: 317, pl. 27, fig. 8; new synonymy.

Stylopsis resticula: Abbott (1974: 291).

Careliopsis bermudensis sensu: De Jong & Coomans (1988: 131, pl. 21, fig. 681); Merlano & Hegedeus (1994: 236, pl. 66, fig. 944).

Figs. 8-15: *Bacteridium resticulum* (Dall, 1889). Figs. 8-10: lectotype (USNM 53555, Florida, U. S. A.), length: 3.7 mm); fig. 11: holotype of *Turbonilla octona* Guppy & Dall (USNM 107178, Ditrupa bed, Trinidad), length: 1.3 mm); fig. 12: shell from Bahama Islands (ANSP 151874), length: 1.4 mm); figs. 13-15: shell from off Recife, pernambuco State, Brazil (MNHN), length: 1.1 mm. All scale bars: 200 μm.

Figs. 16-18: *Careliopsis styliformis* (Mörch, 1875). Figs. 16-17: Shell from off Espírito Santo State, Brazil (IBUFRJ 8834), length: 2.5 mm; fig. 18: protoconch of shell form off Amapá State, Brazil. All scale bars: 200 µm.

Types and type locality

Lectotype (here designated) USNM 53555, sand flats between tides, Florida, U.S.A.; 2 paralectotypes USNM, sand flats between tides, Florida, U.S.A.; holotype and 5 paratypes of *Turbonilla octona*: USNM 107078, Ditrupa bed, Trinidad.

Material examined

The types and: —Bahamas Islands: ANSP 151847, [2] Andros Island, Bahama Islands, 1930, M. Black coll. (Percy Sladen Expedition); —Brazil: MNHN, [1] Praia da Conceição, Pernambuco State, 1984-89, Maestrati coll.; MNHN, [1] Praia de Jaguaribe, Pernambuco State, 1984-89, Maestrati coll.; MNHN, [1] off Recife, Pernambuco State, 1984-89, Maestrati coll.; IBUFRJ 10364, [1] Bacia de Campos, Rio de Janeiro State # 2B (22º 15' 02" S / 040º 19' 39" W, 100 m), ii/1998, "Astro Garoupa" coll.

Diagnosis

Shell very small, elongated. Protoconch of type A, elevated. Teleoconch with six whorls with convex profiles, slightly shouldered below each suture. Axial sculpturing absent. Spiral sculpturing consisting of very fine wavy lines. Sutures deeply impressed. Base elongated, aperture pyriform, inner lip somewhat projected over the base. Length of lectotype 3.7 mm.

Remarks

Bacteridium resticulum (figs. 8-15) was originally described from three shells placed in the genus *Turbonilla* (Dall, 1889). The shell figured in this study is herein designated as the lectotype (fig. 8-10). This species differs from *B. bermudensis* in its larger dimensions, especially its width; its more strongly shouldered whorls; and in the spiral lines, absent in *B. bermudensis*.

In previous works, *B. resticulum* has been allocated to the genus *Stylopsis* A. Adams, 1860 (Abbott, 1974, as a subgenus of *Pyramidella* Lamarck, 1799; Vokes & Vokes, 1983; Rios, 1994). Our reasons for transferring the species to the genus *Bacteridium* are based on the original description of *Stylopsis*, which states "... shell opaque, smooth, plain whorls...". The types of *B. resticulum* are not smooth and have a translucent surface, with slightly convex whorls, being similar to the type species of the genus *Bacteridium*.

The holotype of *Turbonilla octona* Guppy & Dall, 1897 (fig. 11), described from the Miocene of Trinidad, is identical to *B. resticulum* and should be considered a junior synonym.

The specimens illustrated by De Jong & Coomans (1988) and Merlano & Hegedeus (1994) and named *Careliopsis bermudensis*, are actually *B. resticulum*.

The species illustrated by Vokes & Vokes (1983) and Rios (1994) are *B. bermudensis* (see above). However, *B. resticulum* does occur on the Brazilian coast, according to some shells collected on the coasts of the states of Pernambuco and Rio de Janeiro (fig. 13-15). Although these specimens have fewer whorls, they are very similar in proportions, shape, and sculpturing to the types of *B. resticulum*.

The first report of *B. resticulum* was from the coast of Florida, its type locality. The present report is the southernmost record of this species, which is also present in the Bahamas, the Caribbean region of Colombia (De Jong & Coomans, 1988), and in the Miocene deposits of Trinidad (Guppy & Dall, 1897).

Genus *Careliopsis* Mörch, 1875

Type species by monotypy: *Monoptygma* (*Careliopsis*) *styliformis* Mörch, 1875.

Diagnosis

Shell small, with fine spiral cords and ribs somewhat distinct; protoconch heterostrophic, of type B tending to A.

Remarks

The genus *Careliopsis* was introduced by Mörch (1875) as a subgenus of *Monoptygma* A. Adams, 1851, to include the species *M.* (*C.*) *styliformis*. The first illustration of this species was apparently by Thiele (1929). We follow Van Aartsen (1994) in considering *Careliopsis* as a genus-level taxon.

***Careliopsis styliformis* (Mörch, 1875) (Figs. 16-18)**

Monoptygma (*Careliopsis*) *styliformis* Mörch, 1875: p. 169; Thiele (1929: p. 256, fig. 243).

Eulimella bermudensis sensu: Castellanos (1982: p. 77, fig. 13); Zaffaroni (1989: p. 123, fig. 1); Farinati (1994: p. 307, fig. 19).

Turbonilla (*Careliopsis*) *styliformis*: Vokes & Vokes (1983: pl. 31, fig. 15).

Types and type locality

Type not located; St. Thomas.

Material examined

—North America: USNM 87269, [1], Sarasota Bay, Florida, Hemphil coll.; —Brazil: IBUFRJ 10496, [2] off Amapá State, AMASSEDS expedition; MORG 16516, [1] Foz do Amazonas (100 m), x/1970; IBUFRJ 8834, [1] REVIZEE # VV22 (20º 22' S / 040º 05' W, 33 m), 27/ii/1996; —Argentina: MACN 28872, [2] Mar del Plata, Provincia de Buenos Aires, R. Bidart leg.

Diagnosis

Shell small, with five whorls which cease to increase in diameter in the third/fourth whorl; Protoconch of type A, with about two whorls, both partially immersed in the first teleoconch whorl; Spiral sculpturing present over the entire surface of the teleoconch and consisting of cords of irregular width, the spaces between them are crossed by very fine axial ribs which become stronger below the sutures of some shells; at low magnification, the sculpturing appears as spiral lines of microscopic points; Base elongated, imperforate, aperture pyriform, without columellar fold.

Remarks

Castellanos (1982), Zaffaroni (1989), and Farinati (1993) provided illustrations of *Careliopsis styliformis,* identified as *Eulimella* (*Careliopsis*) *bermudensis*, from the coasts of Argentina and Uruguay. Examination of the holotype of *B. bermudensis* (see above) revealed that the species illustrated by Castellanos, Zaffaroni, and Farinati was a different species. The species reported from Argentina and Uruguay is actually *Careliopsis styliformis*, which differs from *B. bermudensis* in the presence of both axial and spiral sculpturing and in its larger dimensions.

In Brazil, *C. styliformis* (fig. 16-18) was collected in the states of Amapá, Espírito Santo, and São Paulo. The species shows some degree of intraspecific variation, especially in the strength of the axial ribs, which may be nearly absent in some specimens.

Careliopsis styliformis is now considered to occur in Florida, St. Thomas (the type locality), the Yucatan Peninsula (Vokes & Vokes, 1983), the northern and southeastern coasts of Brazil, and the coasts of Argentina (Castellanos, 1982; Farinati, 1993) and Uruguay (Zaffaroni, 1989). It probably occurs along the entire Brazilian coast.

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Contribution to the knowledge of the family Caecidae: 13. *Caecum rolani,* new name for *Caecum bimarginatum* Dautzenberg, 1912 non P.P. Carpenter, 1859 (Caenogastropoda: Rissooidea)

Mauro Pizzini & Italo Nofroni

KEY WORDS: *Caecum rolani* new name, nomenclature, homonymy, *Caecum bimarginatum*, marine, Recent.

ABSTRACT *Caecum rolani* nom. nov. is here proposed for *Caecum bimarginatum* Dautzenberg, 1912, primary homonym of *C. bimarginatum* Carpenter, 1859. The authors report Dautzenberg's original description and figures, adding a more detailed description and further data on the species.

RIASSUNTO Gli Autori propongono il nuovo nome *Caecum rolani* in luogo di *C. bimarginatum* Dautzenberg, 1912, omonimo primario di *C. bimarginatum* Carpenter, 1859. Vengono presentate la descrizione e le figure originali di Dautzenberg e si forniscono, nel contempo, una descrizione più dettagliata ed alcuni dati aggiuntivi sulla specie in esame.

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INTRODUCTION

DAUTZENBERG (1912: for the date of publication see TRINGALI 1995) described *Caecum bimarginatum*, a species found during the Gruvel Mission (1909-1910) along the West African coast. However, the name *bimarginatum* had been already used in 1859 by Carpenter for an Indo-Pacific species, quite distinct. On the basis of ICZN (1999), articles 52 (1, 4) and 57, the name proposed by Dautzenberg results a primary homonym and can not be used. As no synonyms are available and *C. bimarginatum* Dautzenberg, 1912 is a valid species, we propose herein the new name:

Caecum rolani *nomen novum*
pro Caecum bimarginatum Dautzenberg, 1912 not Carpenter, 1859
(Figs. 1-2)

ABBREVIATIONS USED

MNHN: Musée Nationale d'Histoire Naturelle, Paris
NHML: National History Museum, London

TERMINOLOGY

Cutting plane: the plane individuated by the edge of the shell at the apex (excluding septum and mucro).

DERIVATIO NOMINIS

The specific name is dedicated to our friend Emile Rolán (Vigo, Spain), well-known malacologist, who sent us a lot of interesting Caecidae from West Africa.

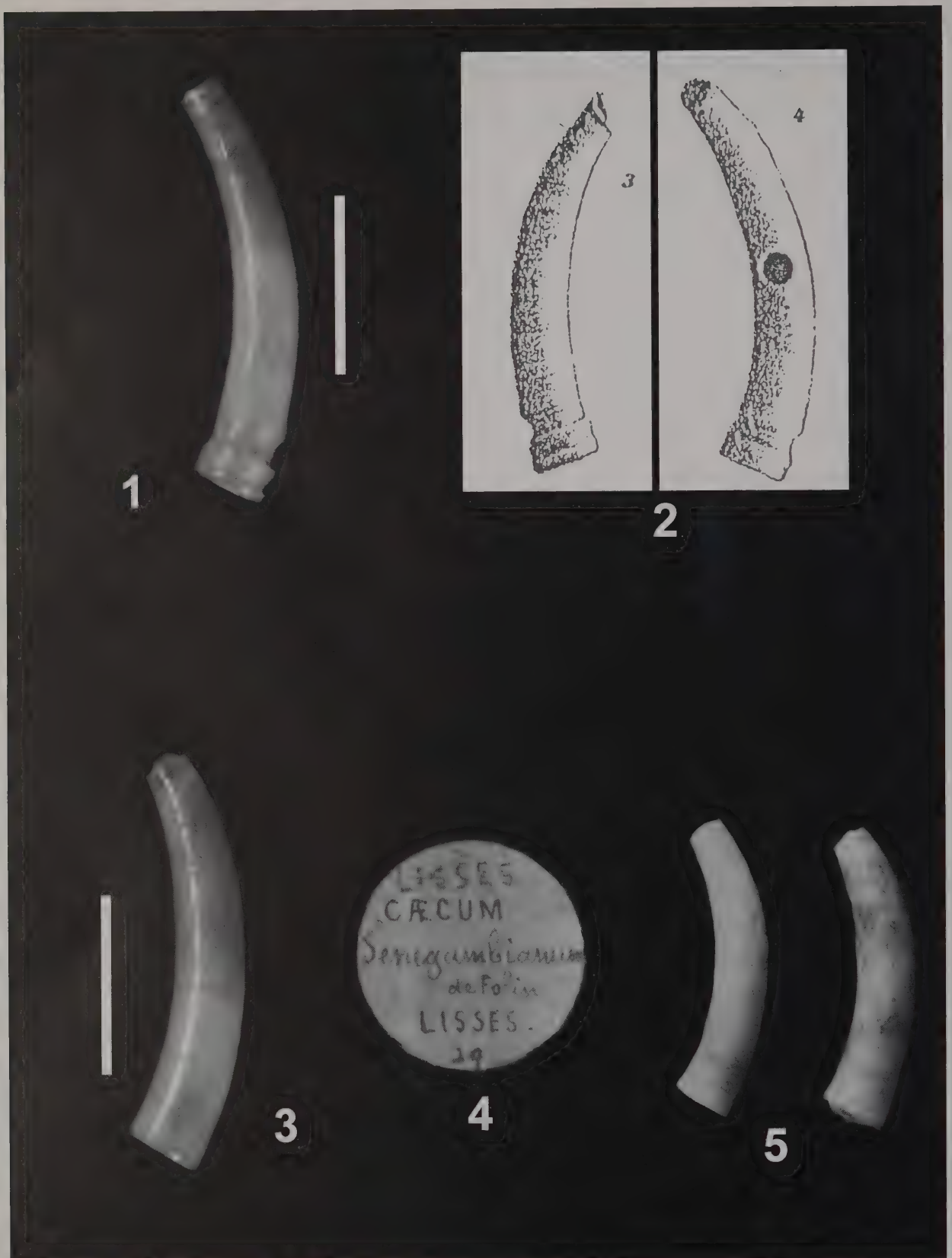
ORIGINAL DESCRIPTION

C. bimarginatum Dautzenberg, 1912 (: 45; pl. II, figs. 3-4):
" *Testa arcuata, tenuis, subdiaphana, striis incrementi irregularibus tantum ornata; versus aperturam in dorso praecipue contracta ac deinde bi-annulata. Apertura circularis, parum obliqua, ab annulo ultimo-marginata. Septum rotundatum, parum prominulum.*
Color albus.
Altit., 2; diam. Maj. 0.5 millim. "

ADDITIONAL DESCRIPTION

Shell yellowish, slender, slightly arched, opaque. Tube smooth, subcylindrical. There is no visible microsculpture even at a high magnification (180 X), also on shells without periostracum. Towards the aperture, the tube forms a weak ring, occasionally divided in two parts followed by wide groove with a evenly rounded bottom. A second ring follows, much more marked than the first, followed in turn by a third, very similar ring. These last rings are divided by a more or less marked interspace (in some cases similar at all to their previous groove). The grooves and the rings are more marked on the dorsal side, than on the ventral one. A temporary septum (see Pizzini *et al.*, 1998) is present (yet not visible in the photographed specimen), white, fragile and prominent. If broken, a second septum may be noticed, the final one, more solid, yet smaller, irregularly hemispherical, slightly protruding above the cutting plane. Young shells are quite similar to adult ones. Operculum, larval shell and soft parts are still unknown.

TYPE MATERIAL

C. bimarginatum Dautzenberg, 1912, not seen.
C. bimarginatum Carpenter, 1859: 1 syntype (adult) from Australia, NHML Reg. n. 1858.12.9.26; 1 syntype (juv.) from Singapore, NHML Reg. n. 1858.12.9.25.
C. senegambianum Folin, 1870: 18 syntypes from Ile Cagnabac, MNHN.

Figures 1-5. 1-2. *Caecum rolani* nomen novum pro *Caecum bimarginatum* Dautzenberg, 1912. 1. Ghana, loc. Mia-Mia, 12 m depth; 2.37 mm length, 0.45 mm Dmax, 0.25 mm dmin. 2. Original figure of *C. bimarginatum* (DAUTZENBERG, 1912: planche II figs. 3, 4). 3-5. *C. senegambianum* Folin, 1870. 3. Ghana, loc. Mia-Mia 12 m depth; 2.3 mm length, 0.45 mm Dmax, 0.3 mm dmin. 4. Original label. 5. Syntypes (MNHN coll.), no measure available. Scale bars 1 mm.

The designation of lectotypes and paralectotypes of *C. bimarginatum* Dautzenberg, 1912 and *C. senegambianum* Folin, 1870, will be made on Revision of the Caecidae of the West Africa, actually in progress by the Authors.

MATERIAL EXAMINED

*Caecum rolani (*n.n. pro *C. bimarginatum* Dautzenberg, 1912) Ghana, 1 shell (coll. E. Rolán); Miamia (Ghana), 25 m depth, 7 shells (coll. E. Rolán); Miamia (Ghana), 12 m depth, 9 shells (coll. E. Rolán).

Caecum bimarginatum Carpenter, 1859
The type material.

Caecum senegambianum Folin, 1870
The type material, and: Conakry (Guinea) VII/1992 A. Vigo leg., 3 shells (coll. Pizzini); Miamia (Ghana), 25 m depth, 56 shells (coll. E. Rolán); Miamia (Ghana), 12 m depth, 37 shells (coll. E. Rolán); Bushua (Ghana), 5 m depth, 9 shells (coll. E. Rolán).

REMARKS

The most similar species to *Caecum rolani* is *Caecum senegambianum* Folin, 1870 (Figs. 3-5), a species that was known by Dautzenberg (see e.g., 1910: 123; 1912: 44, under the possibly mispelled name of *senegambicum*).
Since the general tube morphology of *C. senegambianum* is quite identical to that of *C. rolani* (Figs. 1-2), it could be supposed to be the juvenile stage of *C. rolani.* Yet, in *C. senegambianum* the shrink of the tube at the aperture is perfectly symmetrical, on the ventral and dorsal sides; in *rolani* instead, the ventral side shows a marked indentation, just a little before the formation of the first ring. Furthermore, the mucro of *C. rolani*, albeit of the same shape of that of *C. senegambianum*, is oriented more backward with respect to the cutting plane. Taking note of its shape, *C. rolani* is among the most characteristic *Caecum* of West Africa.
Since *C.* is not well-known, we provide hereby some pictures of it. The figure given by Dautzenberg shows a septum (Fig. 2), probably broken, which does not fit the usual septum of this species. In fact, it is actually dome shaped, without the pointed mucro of the original drawing.

GEOGRAPHIC DISTRIBUTION

So far known only from Guinea and Ghana (West Africa).

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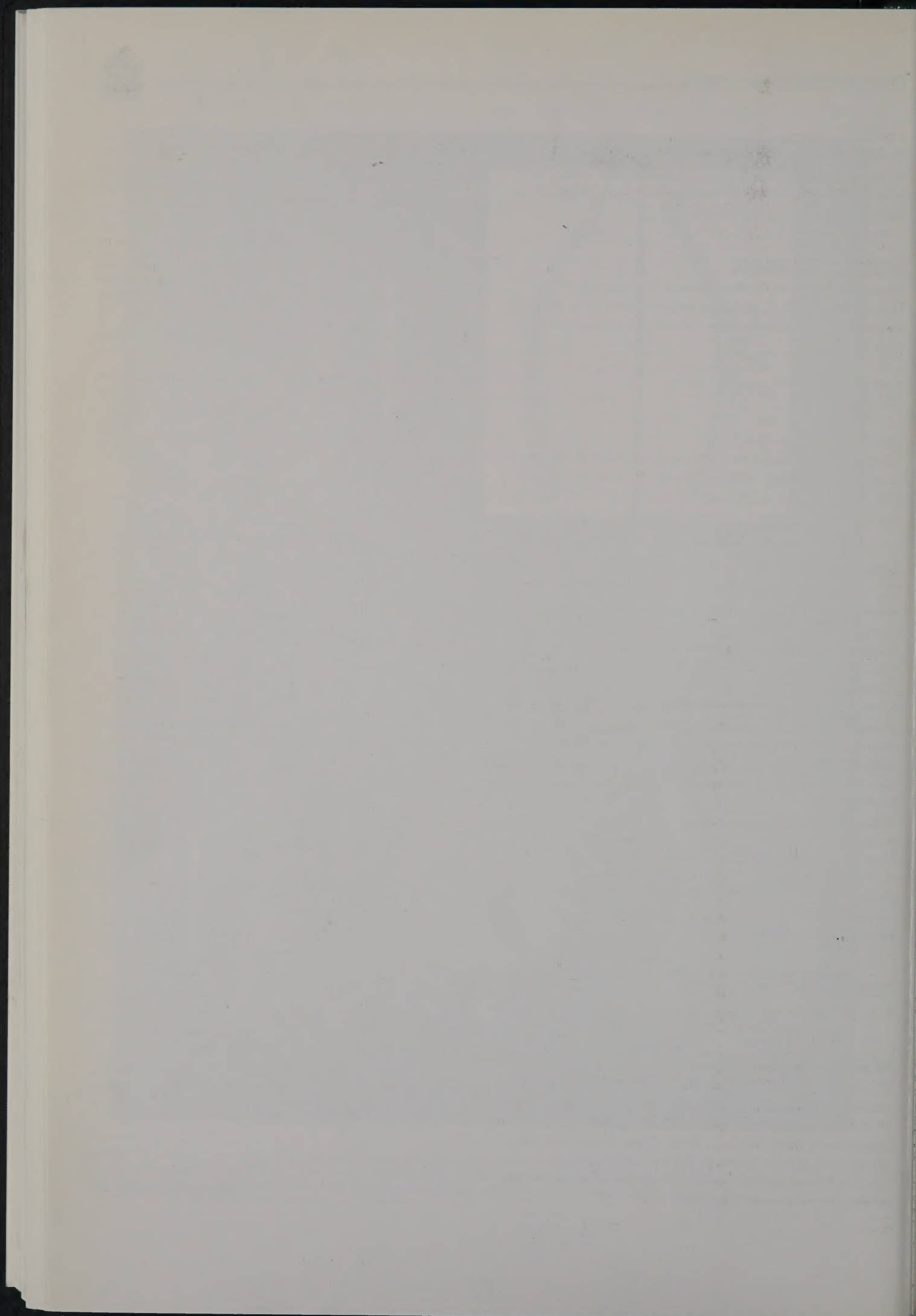
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